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Electron User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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TO ORDER, PLEASE USE THE FORM ON PAGE 53

electron user NEWS

Electron sales top at big Show

Electron fans packed the Show

WITHIN an hour of the doors being opened for the spring Electron & BBC Micro User Show, the scene was set to break not one but four records – thanks in no small part to the Electron.

At that time the tunstiles were temporarily closed because of the volume of people flooding into the New Horticultural Hall.

It was a situation repeated on several occasions during the three day event which attracted more than 16,000 visitors, an all-time high.

The first day alone saw more than 5,000 enthusiasts converge on the exhibition – the largest number ever during a weekday.

Yet another record fell when it was assessed that more than £1,200,000 worth of business had been achieved at the show, beating the previous best by £200,000.

Nor were the smiles confined to the faces of exhibitors. A survey of stands showed more than 500 special offers on display – close to 100 in excess of the former record.

"It was just fantastic", reported John Huddlestone of Advanced Computer Products, a leading supplier to the Electron market.

"We took more on the first morning than we did for any of the previous shows. In fact we sold out of our new AP4 interface for the Electron by noon that day.

"The only trouble is having exhibited at the last few shows, I'm now running out of superlatives to describe them".

He went on to point out that interest in the Electron demonstrated at the show now far outweighed that in the BBC Micro.

"Even though obviously a lot of people had come to see the new Master 128, even that was pushed into second place in the popularity stakes by the Electron.

"In fact although we sell add ons for all three machines, Electron sales surpassed those of the other two quite easily".

A similar story was to be heard around the show with exhibitors revealing that products for the Electron were outselling those for the BBC Micro by three to one.

Companies in the Electron market are really reaping the benefits at the moment", Bob Simpson of Micro Power told *Electron User*.

MORE IN SCHOOLS

A SURVEY has shown that Electrons are becoming increasingly popular in classrooms across the country.

Schools short of funds are eagerly seizing on the cut-price machine to provide support for their complement of BBC Micros.

What is attracting the teachers is that by combining the Electron with the new AP4 disc interface they have a package with many of the BBC Micro and Master features. "And what is most important is that you get all this for well under £200", explained Ken Gill, a Birmingham schoolmaster.

The AP4 interface from Advanced Computer Products is fully Acorn compatible, running 1770 DFS at &E00.

As a result, it enables more tape software to be run from disc, does not use up any of the RAM inside the machine, and allows the user to access compatible BBC disc-based software.

Officially launched at the Electron & BBC Micro User Show, there was a heavy demand there for the innovation – particularly from teachers.

"They were beating their way over to our stand in droves", says John Huddlestone of ACP, "for they see that this combined with the Electron provides the first true cheap alternative to the BBC Micro".

Budget boom

THE fight for the rapidly growing budget-priced games software market has intensified – with Electron users the first to benefit.

Artic has now spearheaded a drive in the budget market with its first two releases for the Electron.

Charles Cecil, a director of Artic, said: "We have had good sales even before our publicity drive. If they continue we will respond with two new titles every four to six weeks".

The two games for the Electron – Woks and The Great Wall – cost £1.99 each.

Enthar Seven coming

A MODE 6 version of Robico's disc-only adventure Enthar Seven is soon to be launched for the Electron.

The game currently only runs on a disc-based BBC B, B+ or Master. It features 450 locations, more than 130k of text and an advanced command line interpreter to bring the science fiction package to life.

However Robico has now used the Advanced Computer Products 1770 DFS, which is Acorn DFS compatible and leaves enough of the Electron's memory left for the adventure.

The Electron version will be identical to the BBC version with the exceptions that there will be no colour option for text and the @BUFFSAVE and @BUFFLOAD commands which save and load a game to and from memory will be omitted.

Enthar Seven will cost £17.95 on twin disc 40 track and £16.95 on single disc 80 track.

Meanwhile Robico has completed the storyline for the third and final part of the Rick Hanson trilogy.

ACORN MAY RE-RELEASE DORMANT SOFTWARE

IN the wake of the continuing boom in Electron software sales, Acorn is currently considering re-releasing dormant titles.

Discussions are being held with Greyhound Distribution, the company which recently acquired the rights to all the Electron titles produced by Acornsoft.

At that time up to 100 programs were involved, among them the best seller Elite, a number of utilities including View and Viewsheet, a host of educational software and languages such as Pascal and Logo.

In all around 100,000 units were bought by Greyhound, but such has been the demand since that time that many of the best known programs will soon be out of stock.

TROPHIES and a weekend in London were the prizes for the five-strong Micro Power telesales team from Leeds for beating their targets for Electron software. But it wasn't all fun. They had to roll up their sleeves on the company's stand at the Electron and BBC Micro User Show while they were down there.

"That is why we are currently discussing with Acorn the question of re-issuing titles", Bob Simpson of Greyhound told *Electron User*.

"In effect it will mean putting back into production a number of programs".

Greyhound's parent company – Micro Power of Leeds – has been responsible for marketing the Acornsoft product primarily via mail order.

"And it has gone extremely well – even better than we hoped", says Bob Simpson. "But the same could be said for most companies offering Electron software I imagine. For the people who stayed in this market are reaping the benefits.

"It proves our confidence in this market was well-founded.

Electron boom in Indonesia

THE Electron is in the forefront of a home computer boom in faraway Indonesia.

But there's a danger that the machine's successful marketing drive could run out of steam due to a shortage of peripherals and spare parts.

Regular reader Wibowo Soelistyo, who runs a computer shop in Semarang, wrote to ask for *Electron User's* help in ensuring that supplies don't dry up completely.

He sent a sheaf of photographs to show how popular the Electron stand was at a recent computer exhibition in Indonesia.

Now he wants UK suppliers of Electron products to help him service the growing number of Electron owners in his country.

"As an Electron dealer I have sold many of these machines", Wibowo wrote. "We also have a workshop and technicians to service Electrons, but we find great difficulty in getting spare parts such as the RF modulator, keyboard cable connector and others.

"I would be grateful to hear of anyone in the UK who could supply us with spare parts, software and other products for Electron expansions".

Wibowo Soelistyo can be contacted at Gemah Permata Computer Shop, Pusat Pertokoan, Lima Blok H No. 5, Semarang 50241, Indonesia.

More speed, memory

A NEW 6502 second processor from Permanent Memory Systems, the PMS-E2P, is claimed to make the Electron as powerful as the BBC Micro.

It plugs into the Plus 1 to give more usable RAM and faster program execution. It has 64k of RAM on board and 60k is available for machine code program and data.

The company says PMS-E2P will run Prolog, Lisp, Iso-Pascal, Comal, Ultracalc and Turtle Graphics with significant increases in speed and memory in addition to more popular languages like Basic and View.

The device uses a 6502A processor running at 2MHz and PMS says the standard benchmark timings show it is on a par with the BBC Micro in all modes.

Programs which involve graphics manipulation show even larger speed increases.

The add-on requires no modifications to the Electron and is compatible with the Plus 3 and Cumana disc interfaces.

The PMS-E2P follows the Acorn Tube protocols and all software written to these standards will operate correctly, says the company. The price will be £89.

MicroLink
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No. 11 July 1986

NEWSLETTER

MicroLink for import export organisation

ONE of Britain's leading import-export organisations has chosen MicroLink as the communications medium for its near 10,000 members around the world.

The prestigious British & Overseas Institute of Import Export Traders is a totally non-profit association run solely by its members who volunteer for election as officers.

It was founded in 1972 by a group of small companies and individuals who pooled their resources and knowledge to start a joint export sales drive to promote their respective products in Europe.

From this small beginning the Institute has grown to be a highly respected organisation with members all over the world.

"As its main function is to bring exporters into contact with overseas importers, it is a logical progression to require a quick and efficient standard means of communication", a spokesman said.

"As a result of this requirement the products and services committee of the Institute recommended all members to start using electronic mail".

Bill Vickerman, chairman, and Bob Pinder, senior exports consultant – both based in Liverpool and already MicroLink users – said they chose MicroLink because it was reasonable in cost and highly effective in its means of communicating with members.

"It is a quick means of spreading the information that our members need to conduct their business efficiently", said Mr Vickerman.

"It is also a British service that is constantly bringing out new and better means of communication and in its way is a vital aid to our continual search for further British export trade".

New news service

MEMBERSHIP of MicroLink doesn't just mean access to its broad range of communications and other value added services. It also opens the door to a wealth of information on the host Telecom Gold system.

The main MicroLink menu makes it simple to dial up the many fascinating databases on Telecom Gold.

Latest addition to the list is World Reporter, a massive full-text database of international news, current affairs and business information, operated by Datasolve.

Its sources include some of the world's leading news gatherers including the Financial Times, Washington Post, The Guardian and the BBC.

Log-on to book in

MORE good news about the International Official Airline Guide, which was added to MicroLink's growing list of value added services last month.

As well as supplying the very latest data from more than 750 airlines worldwide – with details of 1½ million flights – and ensuring trouble-free and more economical flight arrangements, OAG also takes the strain out of choosing a hotel at the other end of your journey.

The same source that provides you with unbiased, up-to-date flight and fare information now brings a world of hotel and motel listings to your computer terminal. Through the medium of MicroLink you can press a few keys and view over 17,000 North American hotels, more than 9,000 in Europe and 3,000 in the Pacific area.

You simply tell the OAG Electronic Edition the city you're going to and the location you prefer – near the airport, downtown or in a nearby suburb or resort – and in seconds you get a comprehensive alphabetical listing of hotels and motels in the location you've selected.

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HERE'S HOW TO DRAW THE LINE AT COORDINATES

Part Five of the Electron graphics series by TREVOR ROBERTS

WE have already seen how we could get our Electron to draw lines on the screen. To do this we used the keywords MOVE and DRAW along with a pair of coordinates.

These coordinates came from dividing the screen into 1280 parts horizontally and 1024 vertically.

However we saw that we couldn't switch these points on and off individually, we had to take them in blocks.

The size of these blocks, or pixels, vary with the mode the Electron is in. Program I should help refresh your memory.

This fills the screen with a grid of lines. Line 20 puts the micro into Mode 1, the four colour graphics mode we'll be sticking to for the rest of the article.

Lines 30 to 60 form a FOR . . . NEXT loop with control variable *vertical*. This varies from 0 to 1279 in steps of 16. The MOVE of line 40 returns the graphics cursor to the bottom of the screen, Y coordinate 0.

The DRAW of the next line promptly draws a line from that point to the top of the screen, Y coordinate 1023.

```
  10 REM Program I
  20 MODE 1
  30 FOR vertical=0 TO 127
9 STEP 16
  40 MOVE vertical,0
  50 DRAW vertical,1023
  60 NEXT vertical
  70 FOR horizontal=0 TO 1
023 STEP 16
  80 MOVE 0,horizontal
  90 DRAW 1279,horizontal
 100 NEXT horizontal
```

Program I

```
  10 REM Program II
  20 MODE 1
  30 VDU 23,1,0;0;0;0;
  40 FOR loop=1 TO 100
  50 MOVE 640,512
  60 DRAW RND(1279),RND(10
23)
  70 NEXT loop
```

Program II

As *vertical* increases in value a series of vertical lines is drawn starting at the left edge of the screen and moving across it to the right.

The next loop does the same thing, except now the lines are drawn across the screen from the left – X coordinate 0 – to the right – X coordinate 1279.

Don't be content with just looking at the listing. Try changing the program. Why have I picked a step of 16 and not 8 or 12? Try it and see.

Can you make the vertical lines appear from right to left and the horizontal from top to bottom? And what about some diagonal lines?

When you've tired of that and strained your brain thinking of coordinates have a look at Program II. This has the Electron deciding on the coordinates for you.

There's no great mystery involved in the code. Line 20 selects Mode 1 again and line 30 switches off the flashing cursor.

The FOR . . . NEXT loop of lines 40 to 70 cycles 100 times, producing in all 100 lines. Each time round the loop line 50 MOVEs the graphics cursor to the centre of the screen, 640,512. Line 60 DRAWs the lines.

As ever the DRAW command is followed by two coordinates to tell the micro which point to draw the line to. Now, however, the micro itself chooses the point.

The X coordinate is supplied via the Electron's random number generator with the use of a RND(1279). RND(1023) supplies the Y coordinate.

Notice that these numbers allow the line to be drawn to any point on the screen. What do you think would happen if we allowed numbers that went off the screen with a line like:

```
60 DRAW RND(2000),RND(2000)
```

Try it and see. Leave out line 50 and explain the results.

Now all these patterns are nice, but if, like me, you're bursting with artistic talent it won't be long until your muse inspires you to produce a masterpiece woven from MOVEs and DRAWs. Program III shows the result in my case.

Eat your ear off Van Gogh. Well maybe not, but it is at least vaguely recognisable as a house.

All I did to create the program was draw the outline of a piece of squared paper and estimate the coordinates. Then I just strung them together with a set of MOVEs and DRAWs.

As you can see the method works, but I'm not too impressed with it.

If I went on to elaborate the building, say with a chimney or doors and windows, then I'd end up with a program that would be a long string of MOVEs and DRAWs. Program IV shows a better way of tackling the same problem.

Here the program has only one DRAW and one MOVE, yet it does the same job. This is because the graphics commands are stuck inside a loop while the coordinates they use are held in the DATA lines at the end of the program.

```
  10 REM Program III
  20 MODE 1
  30 REM BOX
  40 MOVE 100,100
  50 DRAW 400,100
  60 DRAW 400,300
  70 DRAW 100,300
  80 DRAW 100,100
  90 REM ROOF
 100 MOVE 100,300
 110 DRAW 150,400
 120 DRAW 350,400
 130 DRAW 400,300
 140 DRAW 100,300
```

Program III

As the loop cycles it reads values into three variables – *switch*, *x* and *y*. If *switch* is 1 the program MOVEs the graphics cursor to point *x,y*.

If *switch* is 2 then *x,y* is DRAWn to. The final date line just contains sentinel values that stop the loop. If you wonder why there are three of them try:

```
140 DATA 3
```

and see the resulting error message. If you want an example of a tricky little bug try replacing lines 60 and 70 with:

```
60 IF switch=1 THEN MOVE
x,y ELSE DRAW x,y
```

which may at first sight appear to do the same thing.

Another way of lessening

the clutter of MOVEs and DRAWs that tend to accumulate in graphics programs is to use procedures to lump together the commonly used bits of artwork code. Program V shows what I mean.

If you look at PROCsquare you'll see that it consists of one MOVE and four DRAWs.

The procedure takes the point *xbase,ybase* as the bottom left-hand corner of the square and using *side* works out the coordinates of the other corners. Combining these with the appropriate keywords produces a square on screen.

Lines 30 to 80 of the program call the procedure up to 10 times. Each time the bottom left-hand corner of the square is positioned randomly and *length* varies between 0 and 200.

Notice that the figures in the RNDs of lines 50 and 60 are the screen dimensions reduced by 200. This ensures that even the largest square will fit on the screen.

Try changing the procedure so that it produces a rectangle at point *xbase,ybase* with sides of length *length* and breadth *breadth*. Why not use it with Program II or Program IV to give the house doors, windows or even a chimney?

You could store whole elements of pictures in procedures, calling them as necessary. The only limit is your imagination, as people on television micro shows are fond of saying.

Once you've got a procedure figured out you can use it in all sorts of ways. Program VI shows our PROCsquare used to produce some nice patterns.

Although our old PROCsquare forms the basis of the program the output is completely different. This is because the parameters passed to the procedure are different.

Lines 30 to 50 give them initial values. The REPEAT ... UNTIL loop formed by lines 60 to 100 then alters their value and calls PROCsquare. It's this that causes the pattern to appear.

Try changing lines 70 and 80 to lines like:

```
70 bottomLeftX=bottomLeftX
+ 10
80 bottomLeftY=bottomLeftY
- 10
```

adding or subtracting different values each time. It's surprising how the output changes with just a minor alteration to the code.

That's all about MOVE and DRAW down in black and white. But what of coloured lines, as promised last time?

You'll recall that when we wanted coloured text we just used the COLOUR command. We can't use COLOUR to give us coloured lines, but what we can use is the GCOL – Graphics COLour – command. The format of the command is:

```
GCOL 0,logical colour
number
```

where the logical colour number is exactly the same as the one we used with COLOUR. Remember our talk of paint brushes or pens?

Mode 1, which we've been using in our programs, is a four colour mode, so we have available:

0	black
1	red
2	yellow
3	white

As the background is normally black it may seem daft to want to draw lines in black, but it does come in useful at times. Think of erasing lines if you don't believe me.

White is the default graphics colour at switch – on or mode change. Let's use GCOL to draw a red line. Put the Electron into Mode 1, if it isn't already, with:

```
MODE 1
```

which will automatically position the graphics cursor at 0,0 – the bottom left of the screen. Then select red with:

```
GCOL 0,1
```

Notice that the text colour doesn't change – it's still white. Now draw a line to the centre of the screen with:

```
DRAW 640,512
```

and if all is well you'll see a red line. Select yellow with:

```
GCOL 0,2
```

and your diagonal is completed in yellow by:

```
DRAW 1279,1023
```

That's all we're doing on GCOL for the moment although there's an awful lot more to it, as you'll know if you've glanced at the manual.

Now that you've learnt to unleash the Electron's colours try using them in some of the previous programs. In Program I you'll find that the lines:

```
25 GCOL 0,1
65 GCOL 0,2
```

produce a yellow and red grid that looks a sort of brown/orange mixture. Program II is transformed with:

```
55 GCOL 0,RND(3)
```

while:

```
65 GCOL 0,RND(3)
```

works for Programs IV, V and VI.

● *On that colourful note we'll leave it for now. Next month we'll be looking into windows.*

```
  10 REM Program IV
  20 MODE 1
  30 switch=0
  40 REPEAT
  50 READ switch,x,y
  60 IF switch=1 THEN MOVE
x,y
  70 IF switch=2 THEN DRAW
x,y
  80 UNTIL switch=3
  90 DATA 1,100,100,2,400,
100
 100 DATA 2,400,300,2,100,
300
 110 DATA 2,100,100,1,100,
300
 120 DATA 2,150,400,2,350,
400
 130 DATA 2,400,300,2,100,
300
 140 DATA 3,3,3
```

Program IV

```
  10 REM Program V
  20 MODE 1
  30 FOR loop=1 TO RND(10)
  40 length=RND(200)
  50 bottomLeftX=RND(1079)
  60 bottomLeftY=RND(823)
  70 PROCsquare(bottomLeft
X,bottomLeftY,length)
  80 NEXT loop
  90 END
 100 DEF PROCsquare(xbase,
ybase,side)
 110 MOVE xbase,ybase
 120 DRAW xbase,ybase+side
 130 DRAW xbase+side,ybase
+side
 140 DRAW xbase+side,ybase
 150 DRAW xbase,ybase
 160 ENDPROC
```

Program V

```
  10 REM Program VI
  20 MODE 1
  30 bottomLeftX=500
  40 bottomLeftY=500
  50 side=200
  60 REPEAT
  70 bottomLeftX=bottomLef
tX+10
  80 bottomLeftY=bottomLef
tY+10
  90 side=side-20
 100 PROCsquare(bottomLeft
X,bottomLeftY,side)
 110 UNTIL side<20
 120 END
 130 DEF PROCsquare(xbase,
ybase,side)
 140 MOVE xbase,ybase
 150 DRAW xbase,ybase+side
 160 DRAW xbase+side,ybase
+side
 170 DRAW xbase+side,ybase
 180 DRAW xbase,ybase
 190 ENDPROC
```

Program VI

Star of the command performance

HAVE you been following Robin Nixon's series, Extra Commands? It started in the May 1986 issue of *Electron User* and shows how to add your own commands to Basic, like WHILE/WEND and BEEP.

This month I'm going to show how disc owners can add extra commands, not to Basic though, but to the operating system using star commands. This is much easier as you'll see, but first we need to know what happens to star commands.

When Basic – or any language for that matter – encounters a star command such as *CAT, either within a program or when entered directly from the keyboard, it is passed straight to the operating system (OS). Basic has nothing to do with it.

The OS will check the name of the command against the ones in its command table, and if there's a match it will jump to the appropriate routine to execute it.

So *CAT will catalog the disc or tape. What interests us is what happens when the OS doesn't recognise the name.

First it is offered to any ROMs that are present. Each ROM will check the name against its own list of commands in its command table and decide whether to accept or reject it. If there's a match it accepts it, otherwise it is rejected.

If the command is not claimed by any of the ROMs the OS will offer it to the currently selected filing system. The filing system only has a limited time in which to act on it and if it can't react fast enough the command is rejected. Try:

```
*TAPE
*BEEP
```

None of the ROMs should accept *BEEP and since the tape filing system is slow it cannot respond quickly enough so you will get "Bad command".

Press Ctrl+D+Break if you have DFS and Ctrl+A+Break if you have ADFS. Now try:

```
*BEEP
```

and you'll see the disc drive start up. The disc filing system is pretty quick so it attempts to respond to the command.

What it is doing is looking for a file on the disc called BEEP. If it can't find one it will

print Bad command as before.

However if it does find one it will get its load and execution addresses and, using these, *LOAD it and call it automatically. The file must be a machine code program.

Enter and run Program I. This is a very short assembly listing that creates a machine code program and saves it to disc with the name BEEP.

It assembles to page &C which the OS uses to store character definitions, but since we aren't defining any characters it won't be needed.

```
10 REM PROGRAM I
20 FOR i=0 TO 2 STEP 2
30 P%=&C00
40 [ OPT i
50 LDA &7
60 JSR &FFEE
70 RTS
80 ]
90 NEXT
100 *SAVE BEEP C00 +10
```

Program I

BEEP is a simple routine which loads the A register with 7 and calls &FFEE – with the same effect as VDU 7. If you CALL &C00 to run the machine code routine you'll hear a beep.

Press Break to clear the memory and again try:

```
*BEEP
```

and after a short pause you'll hear a beep. You've added an extra star command to your Electron.

Compare the length of Program I with Robin's equivalent program in the May 1986 issue and you'll see how much easier it is to add star commands.

Program II is a simple demonstration of the new command. You can see it in line 40. As with all star commands you cannot embed it in the middle of a multi-statement line, it must be the last command on the line.

If you run Program II there will be a slight delay as BEEP is loaded before executing it. This is the price we pay for storing extra commands on disc.

The faster the disc system the faster the response to the command. Notice that the Basic program carries on as normal after the *BEEP.

```
10 REM PROGRAM II
20 PRINT'"Press a key"
30 key=GET
40 *BEEP
45 FOR i=1 TO 1000:NEXT
50 PRINT'"It worked!"
```

Program II

You can add many different commands using this method. In fact you're only limited by the number of files you can fit on a disc, and since a command is loaded only as and when it is needed you aren't limited by the Electron's memory.

Program I was a short and simple machine code program, but needn't necessarily be so. Program III is a much longer and more complex command. Enter and run it. The program will assemble a machine code program which is then saved to disc as FILL.

As the name suggests it's a fill routine. To use it to paint an area of the screen set the graphics colour with GCOL, MOVE to the starting point and *FILL will fill the area.

Although not the best fill in the world it does show how powerful this system of extra commands can be.

Program IV is a graphics program demonstrating the new fill command. It draws a yacht and colours it in using *FILL.

Remember that this method of adding commands requires that you have a disc in the drive – and *MOUNTed if you have a Plus 3 – and that the files are present in the current directory or the library directory.

As you've seen from these examples any machine code program can be run simply by entering *NAME and this is treated like any other operating system command. I've shown you two new commands and I'm sure you can think of many more.

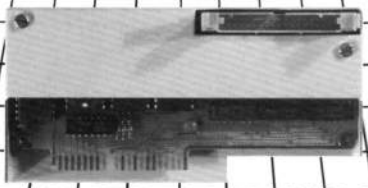
```
  10 REM PROGRAM III
  20 REM *FILL
  30 osword=&FFF1:oswrch=&FFEE
  40 x=&70:y=&72:colour=&74
  50 FOR pass=0 TO 2 STEP 2
  60 P%=&C00
  70 [ OPT pass
  80 LDA #&8D:LDX #block MOD256:LDY #block DIV256:JSR osword \get x,y
  90 LDA block+4:STA x:LDA block+5:STA x+1  \store x
 100 LDA block+6:PHA:STA y:LDA block+7:PHA:STA y+1  \store y
 110 JSR point:STA colour \get pixel colour
 120 LDA #18:JSR oswrch:LDA #0:JSR oswrch:CLC:LDA colour:ADC #128:JSR oswrch \GCOL0,pixel+128
 130 .up
 140 JSR point:CMP #255:BEQ down:CMP colour:BNE down
 150 JSR line
 160 CLC:LDA y:ADC #4:STA y:LDA y+1:ADC #0:STA y+1 \y=y+4
 170 JMP up
 180 .down
 190 PLA:STA y+1:PLA:STA y \get start y
 200 .d1
 210 SEC:LDA y:SBC #4:STA y:LDA y+1:SBC #0:STA y+1 \y=y-4
 220 JSR point:CMP #255:BEQ end:CMP colour:BNE end
 230 JSR line
 240 JMP d1
 250 .end
 260 RTS
 270
 280 .point  \POINT(x,y)
 290 LDA x:STA block:LDA x+1:STA block+1  \set up block
 300 LDA y:STA block+2:LDA y+1:STA block+3
 310 LDA #&09:LDX #block MOD256:LDY #block DIV256:JSR osword
 320 LDA block+4  \get colour
 330 RTS
 340
 350 .line
 360 LDA #25:JSR oswrch:LDA #77:JSR oswrch \PLOT 77,x,y
 370 LDA x:JSR oswrch:LDA x+1:JSR oswrch
 380 LDA y:JSR oswrch:LDA y+1:JSR oswrch
 390 RTS
 400
 410 .block
 420 EQUD 0:EQUD 0
 430 ]
 440 NEXT
 450 *SAVE FILL C00 +D0
```

Program III

```
  10 REM PROGRAM IV
  20 MODE 2
  30 VDU 23,1,0;0;0;0;
  40 MOVE 300,500:DRAW 800,500:DRAW 700,400:DRAW 400,400:DRAW 300,500
  50 MOVE 0,450:DRAW 350,450:MOVE 1280,450:DRAW 750,450
  60 MOVE 300,540:DRAW 500,540:DRAW 500,900:DRAW 300,540
  70 MOVE 600,540:DRAW 800,540:DRAW 600,900:DRAW 600,540
  80 MOVE 100,100:GCOL 0,4:*FILL
  90 MOVE 900,430:*FILL
 100 MOVE 574,550:GCOL 0,1:*FILL
 110 MOVE 610,560:GCOL 0,2:*FILL
 120 MOVE 640,475:GCOL 0,5:*FILL
 130 MOVE 10,800:GCOL 0,6:*FILL
 140 MOVE 1000,800:*FILL
 150 MOVE 1000,475:*FILL
 160 MOVE 590,800:*FILL
 170 MOVE 590,500:GCOL 0,0:DRAW 590,950
```

Program IV

Advanced Computer Products



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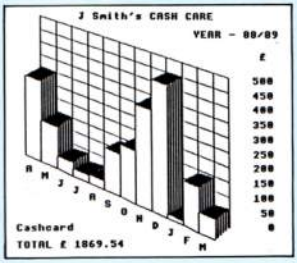
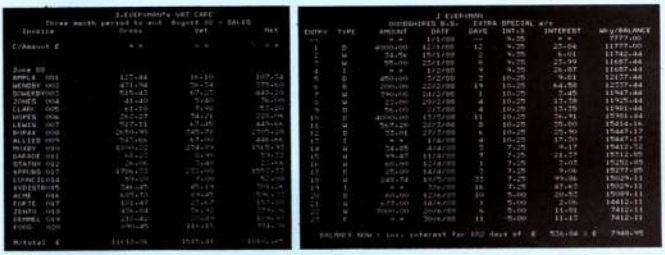
Supplier: Squirrel Software, 4 Bindloss Avenue, Eccles, Manchester M30 0DV. Tel: 061-789 4120

Careful approach to cash

PEOPLE who wish to do the simple tasks well need look no further than The Care Utility Series from Squirrel Software.

I have tested three of Squirrel's programs:





- Cash Care copes with up to 60 categories of income/expenditure in either one or two accounts.
- Vat Care produces the three-monthly VAT liability reports on up to 150 sales or purchase postings per month.
- Building Society Care handles a maximum of 208 deposits, withdrawals or rate changes in any year to a building society account, thereby allowing one to know the interest earned at any given time.

It is a great compliment when I say that Cash Care is the sort of program which you'd wish you could produce at home over a weekend.

At the cost of a take-away meal, Squirrel have taken all the chore out of getting a useful program.

Vat Care adopts the same no frills approach. For the small tradesman who loathes keeping the books and is not interested in copious management information, this is the ideal system.

Whereas Bank and Vat Care work on the time honoured debit-credit-plonk principle, Building Society Care is more like a spreadsheet. This is so that you may experiment in order to test the effect of money being moved around.

Each row represents a transaction, while each cell of the matrix represents the detailed effect the transaction has upon the account.

At a cost of £10 to £15 each they represent excellent value for money.

Jo Stork

Sound	*N/A*
Graphics	*8*
Ease of use	*9*
Value	*10*
Overall	*9*

Program: Bullseye
Price: £7.95
Supplier: Macsen, 17 Nott Square, Carmarthen, Dyfed SA31 1PQ. Tel: 0267 232508

Bullseye loses on points

ELECTRON owners can now experience the tension of ITV's popular dart throwing quiz called Bullseye. The game's format faithfully follows that of the TV program except that it involves just two players.

The first part involves throwing a single dart at a board divided into eight segments. If you hit the area you aimed for you win points and get a question.

A correct answer to the question earns you more points. A wrong answer means your opponent can try to answer it.

Each player has three turns at this and points can only be scored when the section is hit for the first time.

Round two uses a standard match play dartboard. Again the players take turns to throw darts and the person with the highest score earns a question. If this is answered correctly, the darts' score is added to that player's total.

After three rounds the winner moves on to the prize board. Nine darts are thrown and if they land in the small red sections more points are won.

The fourth part of the game involves a gamble. If you can score 101 or more with four darts your score is doubled. If you fail your score is halved.

The graphics are good, with the dart board drawn quickly and neatly. Bully is drawn even more quickly and he bears a good likeness to the TV version.

Even the text is well presented using an unusual, but clear, set of characters.

A couple of spelling bugs are an irritant. I'm not an expert at darts but I thought the line you stand at was called the oche. Macsen have their own version.

I'm also left wondering how they want me to spell the Greek philosopher Plato. With several files of questions, I suppose a couple of mistakes are inevitable. More annoying is the fact that the Plus 1 on the Electron has to be disabled first.

This game lacks a little something. The excitement of the TV program lies in the cash and prizes that competitors win. Mere points seem very dull by compatison.

The darts throwing is also rather predictable. I could consistently throw twenties but the trebles were more elusive. Despite all this the game is quite fun to play if a little slow at times.

Rog Frost

Sound	*5*
Graphics	*7*
Playability	*6*
Value	*5*
Overall	*6*

Program: Tennis
Price: £2.99
Supplier: Bug-Byte, Liberty House, 222 Regent Street, London W1R 7DB. Tel: 01-439 0666

Played out of court

SHOULD you be one of the many thousands of people who spend Wimbledon fortnight glued to the TV set you may have considered trying a computer simulation.

Bug-Byte have just released one such program, though I doubt whether it's destined to be a winner.

You have the option of playing one or three sets with either four or six games per set.

Control is via keyboard or joystick and your opponent is always the computer – you cannot challenge a friend.

This is a pity as the computer provides such stiff opposition that you will normally only win one or two points during a complete set.

The court is drawn with perspective going into your screen, the computer always being at the top of the screen.

When serving, as in the real game, you must remember to keep your feet behind the baseline or you will be foot faulted.

Your player can travel left, right, and up and down the court, and balls can either be volleyed or taken as groundstrokes.

When volleying from the net I would suggest that you do not stand too close as you will tend to hit the ball out of court.

I can only assume that the angle of the shot which you play is determined by your position in relation to the ball, though I didn't find that this made too much difference.

The ball's flight and its associated shadow, was relatively smooth, although on several occasions it vanished for a fraction of a second in mid-flight.

The characters representing the players are large, angular and rather crude. The best part of the screen is the scoreboard where electronic style numbers display sets, points, and server.

Had the game employed a

user selectable skill option it would probably have had more lasting appeal. But in its present form I feel it would soon be abandoned by a thoroughly demoralised player.

James Riddell

Sound	6
Graphics	6
Playability	6
Value	6
Overall	6

Program: Savage Pond
Price: £2.99
Supplier: Bug-Byte, Liberty House, 222 Regent Street, London W1R 7DB. Tel: 01-439 0666

Bargain in the pond

TO most people a frog is a small green slimy amphibian which sits lazily on a lily pad devouring passing flies. I too had this impression until I tried my hand at the tadpole survival course, otherwise known as the Savage Pond.

The screen displays a cross sectional view of the pond. When the game begins the pond is quite barren except for a handful of hydra on the bottom.

Having emerged from one of three eggs you begin to stuff yourself with the nutritious amoebae which float in the water above.

These are useful for gaining points, but do little to aid your progress towards becoming a frog.

Froghood is achieved by consuming the worms which drift from the surface to the bottom. For every five worms consumed you take a step towards maturity, nine such steps and you become a frog.

Unfortunately for our wriggling buddy, life is not a bed of lilies. Apart from the deadly hydra you must also cope with eggs dropped by passing dragonflies.

It is imperative that these are consumed before they reach the bottom because if they are allowed to hatch you will meet your maker at the jaws of a dragonfly larva.

For each step you take towards maturity a new hazard is introduced to the pond.

These take the form of jellyfish, spiders, and even radioactive waste.

Savage Pond was reviewed in this magazine over 18 months ago and received a very favourable reception. It

has now been re-released at less than half the price and is therefore a bargain not to be missed.

Carol Barrow

Sound	7
Graphics	7
Playability	8
Value	8
Overall	8

Program: Jack Attac
Price: £2.99
Supplier: Bug-Byte, Liberty House, 222 Regent Street, London W1R 7DB. Tel: 01-439 0666

Stay ahead of the giant

ONCE upon a time there was a young man named Jack who had a beautiful girlfriend called Jill – until the local giant incarcerated her in his castle.

Being a brave sort of chap Jack decided to enter the castle to attempt a rescue.

The castle takes the form of a 45 screen maze which you must negotiate in order to find the key which will unlock Jill's dungeon.

Different areas are sealed off by coloured doors. These are unlocked by coloured keys which are to be found around the castle.

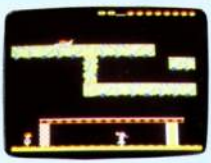
I don't know if the giant is a greengrocer in his spare time but the castle is littered with pieces of fruit. Every one must be collected before you are allowed to free Jill.

As soon as you have released your beloved, the giant will awaken. You must therefore escape from the castle within the next two minutes.

The 45 screens do not need to be completed in sequence, and you are free to wander from place to place as you seek the next key.

Each screen is big, colourful and normally patrolled by a nicely detailed bad guy.

There are also secret passages which can take you from one section to another without the need for a key. I found Jack



Attac a well written, fun to play, and sensibly priced program.

James Riddell

Sound	7
Graphics	7
Playability	8
Value	8
Overall	8

Program: Terrormolinos
Price: £6.95
Supplier: Melbourne House, 60 High Street, Hampton Wick, Kingston-upon-Thames, Surrey KT1 4DB.
Tel: 01-943 3911

The game in Spain . . .

THIS is the best adventure game I have yet seen from Melbourne House.

The object of the adventure is to go on holiday with your family to Spain, taking 10 photographs while you are there. All the photographs have to be taken in the right places and it is up to you to find out where they are.

You start at home. A taxi is due soon to take you to the airport and you must search the house for the things you will need in Spain and get your family together before it arrives.

On arrival you check in at your hotel (make sure it is the right one) and change into more suitable attire before visiting the local shops.

An exploration of the nearby beach will lead to a rewarding encounter with a shark.

You should now sample the nightlife, though the red light district has nothing to do with developing your photographs.

You will find that three coach trips are laid on so remember to take your camera. A colloquial insult will help you to find the missing passenger at the monastery.

The problem that I get asked most is how do you avoid being killed by the bull?

This is solved by remembering that you do not need to protect your head at the moment and by allowing it to break some crockery.

As is immediately apparent from the title, the adventure is very tongue-in-cheek. Unlike Hampstead, where the humour seemed laboured, Terrormolinos hits the right note every time.

Paul Gardner

Presentation	7
Atmosphere	8
Frustration factor	8
Value	7
Overall	8

Program: Jet Set Willy
Price: £7.95
Supplier: Tynesoft, Addison Industrial Estate, Blaydon, Tyne & Wear NE21 4TE
Tel: 091-414 4611

Life is hard for Willy

MANIC Miner was a ladders and levels game which graced just about every home computer on the market. As with most successful games it was quickly followed by a sequel, in this case Jet Set Willy.

Having escaped from the mine, Miner Willy wasted no time at all in spending his new found wealth. After buying a mansion and yacht he decided to throw a party.

The party is a wild success but the housekeeper is rather upset about the aftermath. Willy is given an ultimatum: No sleep until all of the debris has been cleared.

When you live in a 100 room mansion that is some headache.

With Manic Miner each individual screen had to be completed before starting the next. With Jet Set Willy there are no such constraints – you as Willy can wander from screen to screen at will.

However you will only be awarded points for collecting the objects from the party.

When you load up the game for the first time you will see that you are provided with eight Willies. This might seem to be very generous but there is a problem.

Should you manoeuvre Willy into a position that will mean certain death, he will die. He will then be reincarnated in the very same position, unless you have lightning reflexes then he will die again, and again, and you will soon be minus several Willies. Once I lost all eight Willies in under three seconds.

On several occasions I entered the bedroom only to be shown the way out by the irate housekeeper. What I can't understand is that if Willy can afford a 100 bedroom mansion why can't he get decent staff?

Carol Barrow

Sound	7
Graphics	7
Playability	8
Value	8
Overall	8

Program: Ian Botham's Test Match
Price: £7.95
Supplier: Tynesoft, Addison Industrial Estate, Blaydon, Tyne & Wear NE21 4TE
Tel: 091-414 4611

Botham plays on

RAIN may stop play on a regular basis at the Oval but it should cause few problems if you're playing Ian Botham's Test Match. The armchair enthusiast can now put willow to leather all year round.

The game allows one or two players to compete over 16 overs, 32 overs, or a full two innings test match.

When playing against the computer you are always put in to bat first.

A choice of four strokes is available. They are selected by holding down the appropriate key and pressing the Return key to execute the stroke as the ball approaches.

The timing here is very difficult to judge. Unfortunately no matter what stroke the batsman plays he always performs the same movements.

Once your side has bitten the dust – and that won't take long – you position your fielders before bowling. Players are moved using a combination of four keys and set in position by pressing a fifth. On several occasions I found that this positioning key had to be pressed numerous times before a player was released.

You are provided with a choice of four bowlers each having a different pace or style. Having selected fast, medium, spin, or bouncer, just press the Q key and the bowler will make his run up.

When fielding a ball you first move a cursor to the player you wish to move before you can begin to chase the ball.

Normally by the time you have made your selection the ball has reached the boundary.

An element of humour is provided by a little duck, complete with bat and cap, which leaves the field with a tear in its eye as your exit for no runs.

The graphics used in the game are quite reasonable, it is just a pity that the game is so awkward to play.

John Revis

Sound	4
Graphics	6
Playability	5
Value	6
Overall	6

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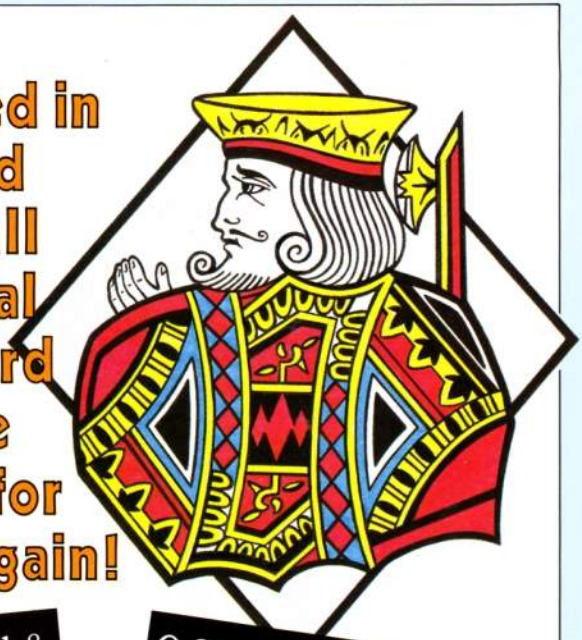

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THE ATTRIBUTES TRAIL..

By ROG FROST

THE Attributes Trail is a two player game in which you and your opponent score points by matching colours and shapes.

You move from square to square on a grid, trying to keep on the same shape or colour.

The game is educational fun for children aged five and over, and is also a brain teaser for adults.

Young children will only be looking one move ahead, but they will be learning about left, right, up and down, as well as shape and colour.

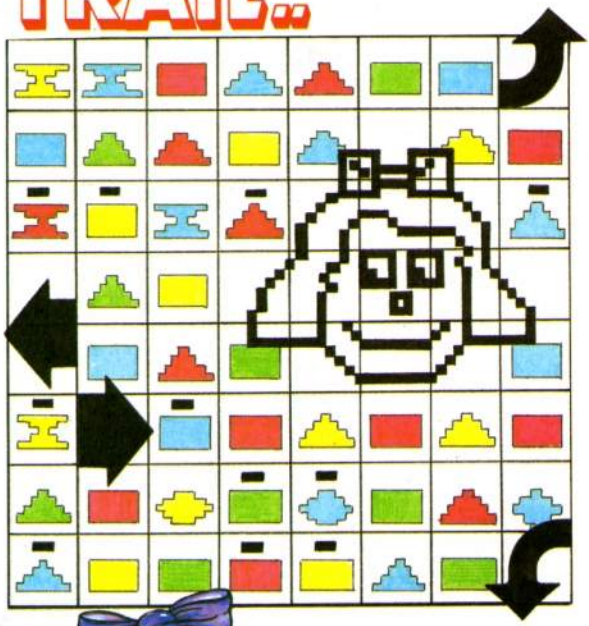
Cannier games players will work out some strategy, but as each square can only be visited once beware of getting blocked in.

You can increase the difficulty of the game either by reducing the time available for each move or by making it illegal to move to a square of the same colour as your opponent's. These options are given in the game.

A feature of the program is the input routine for players' names. Instead of plain INPUT the letters in the name are taken one at a time and amended so that the name appears as a child would write it – first letter is upper case, remaining letters lower case.

The routine also detects spaces and full stops and puts the next letter in upper case.

At the end of the game the faces of the players are drawn with names and scores underneath.



Full listing starts on Page 18

PROCEDURES

init	Defines characters and variables.
instruct	Prints instructions.
grid	Sets up the screen.
delay	A short pause.
end	Draws the faces at the end.

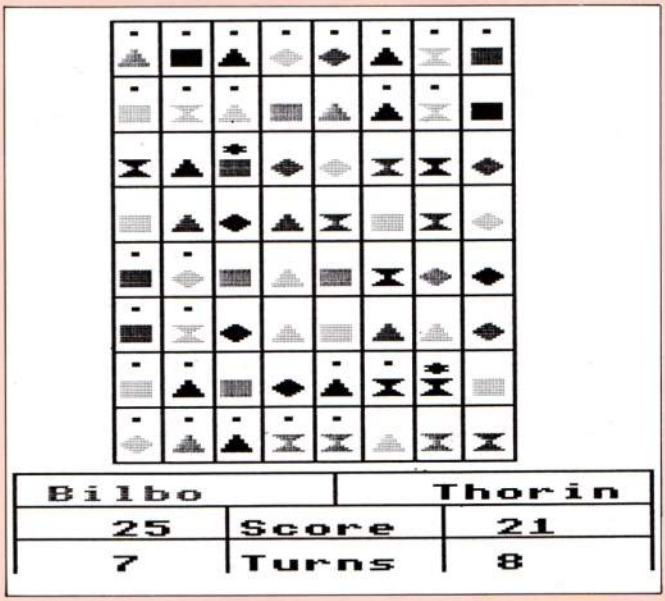
VARIABLES

col%(63)	Colour in each square.
shape%(63)	Shape in each square.
name$(2)	Players' names.
move%	Number of goes taken.
direction$	Player's requested move.
wait%	Time permitted for each move.

From Page 17

```
  10 REM Attribute Trail
  20 REM By Rog Frost
  30 REM (c) Electron User
  40 IF PAGE)&E00 GOTO2200
  50 MODE6
  60 ON ERROR GOTO2140
  70 PROCsetup
  80 PROCinstruct
  90 REPEAT
 100 MODE6
 110 PROCinit
 120 MODE2
 130 PROCgrid
 140 REPEAT
 150 PROCplayerone
 160 PROCplayertwo
 170 UNTILscoreX)39
 180 MODE5
 190 PROCend
 200 UNTIL0
 210 END
 220 DEFPROCgrid
 230 VDU23;8202;0;0;0;
 240 FORgridX=200TO1000STEP100
 250 MOVEgridX,200:DRAWgridX,1000
 260 MOVE200,gridX:DRAW1000,gridX
 270 NEXT
 280 MOVE0,100:DRAW1279,100:MOVE0,120:DRAW1279,120:MOVE0,60:DRAW1279,60
 290 MOVE0,0:DRAW0,100:MOVE1279,0:DRAW1279,100:MOVE640,100:DRAW640,120:MOVE430,120:DRAW430,0:MOVE860,120:DRAW860,0
 300 PRINTTAB(1,27);name$(1)TAB(13,27);name$(2)
 310 PRINTTAB(7,29)"Score"TAB(7,31)"Turns"TAB(0,0);
 320 PRINTTAB(3,29)"0"TAB(15,29)"0"
 330 PRINTTAB(3,31)"20"TAB(15,31)"20"TAB(0,0);
 340 VDU5
 350 FORcell%=0TO63
 360 GCOL0,col%(cell%):MOVEcell% MOD 8*100+220,cell% DIV8*100+250:PRINTCHR$shape%(cell%)
 370 NEXT
 380 GCOL0,7:MOVEposone% MOD 8*100+220,posoneX DIV8*100+280:PRINT"*"
 390 MOVEpostwoX MOD 8*100+220,postwoX DIV8*100+280:PRINT"*"
 400 VDU4
 410 ENDPROC
 420 DEFPROCplayerone
 430 VDU5:GCOL0,15:MOVEposone% MOD 8*100+220,posoneX DIV8*100+280:PRINT"*"
 440 GCOL0,7:MOVEpostwoX MOD 8*100+220,postwoX DIV8*100+280:PRINT"*"
 450 VDU4
 460 COLOUR8:PRINTTAB(1,27);name$(1):COLOUR7:PRINTTAB(13,27);name$(2)
 470 PRINTTAB(3,31)"  "TAB(3,31);21-(moveX+2)DIV2TAB(0,0);
 480 *FX15,0
 490 direction$=INKEY$(wait%)
 500 moveX=moveX+1
 510 IF(direction$="U"OR direction$="u")AND posoneX(56 newposX=posoneX+8
 520 IF (direction$="D"OR direction$="d") AND posoneX)7 newposX=posoneX-8
 530 IF (direction$="R"OR direction$="r")  AND posoneX MOD 8()7 newposX=posoneX+1
 540 IF (direction$="L"ORdirection$="l")  AND posoneX MOD 8()0 newposX=posoneX-1
 550 SOUND1,-15,moveX*5,2
 560 IF flagX(newposX)=1 SOUND1,1,100,50:PROCdelay:ENDPROC
 570 IF difficultX=1 AND col%(newposX)=col%(postwoX) SOUND1,1,100,50:PROCdelay:ENDPROC
 580 VDU5:GCOL0,0:MOVEposone% MOD 8*100+220,posoneX DIV8*100+280:PRINT"*":GCOL0,7:MOVEposone% MOD 8*100+220,posoneX DIV8*100+280:PRINT;CHR$229:VDU4
 590 flagX(newposX)=1
 600 scoreoneX=scoreoneX+1
 610 IFcol%(newposX)=col%(posoneX) scoreoneX=scoreoneX+1
 620 IFshapeX(newposX)=shapeX(posoneX) scoreoneX=scoreoneX+1
 630 posoneX=newposX
 640 GCOL0,7:VDU5:MOVEposoneX MOD 8*100+220,posoneX DIV8*100+280:PRINT"*":VDU4
 650 PRINTTAB(3,29)"  "TAB(3,29);scoreoneX
 660 ENDPROC
 670 DEFPROCplayertwo
 680 VDU5:GCOL0,15:MOVEpostwoX MOD 8*100+220,postwoX DIV8*100+280:PRINT"*"
 690 GCOL0,7:MOVEposoneX MOD 8*100+220,posoneX DIV8*100+280:PRINT"*"
 700 VDU4
 710 COLOUR8:PRINTTAB(13,27);name$(2):COLOUR7:PRINTTAB(1,27);name$(1)
 720 PRINTTAB(15,31)"  "TAB(15,31);21-(moveX+2)DIV2TAB(0,0);
 730 *FX15,0
 740 direction$=INKEY$(wait%)
 750 moveX=moveX+1
 760 IF(direction$="u" OR direction$="U")AND postwoX(56 newposX=postwoX+8
 770 IF(direction$="d" OR direction$="D")AND postwoX)7 newposX=postwoX-8
 780 IF(direction$="R" OR direction$="r")AND postwoX MOD 8()7 newposX=postwoX+1
 790 IF(direction$="L" OR direction$="l")AND postwoX MOD 8()0 newposX=postwoX-1
 800 SOUND1,-15,moveX*5,2
 810 IF flagX(newposX)=1 SOUND1,1,100,50:PROCdelay:ENDPROC
 820 IF difficultX=1 AND col%(newposX)=col%(posoneX) SOUND1,1,100,50:PROCdelay:ENDPROC
 830 VDU5:GCOL0,0:MOVEpostwoX MOD 8*100+220,postwoX DIV8*100+280:PRINT"*":GCOL0,7:MOVEpostwoX MOD 8*100+220,postwoX DIV8*100+280:PRINT;CHR$229:VDU4
 840 flagX(newposX)=1
 850 scoretwoX=scoretwoX+1
 860 IFshapeX(newposX)=shapeX(postwoX) scoretwoX=scoretwoX+1
 870 IFcol%(newposX)=col%(postwoX) scoretwoX=scoretwoX+1
 880 postwoX=newposX
 890 GCOL0,7:VDU5:MOVEpostwoX MOD 8*100+220,postwoX DIV8*100+280:PRINT"*":VDU4
 900 PRINTTAB(15,29)"  "TAB(15,29);scoretwoX
 910 ENDPROC
 920 DEFPROCsetup
 930 VDU23,225,255,255,255,255,255,255,255,255
 940 VDU23,226,24,24,60,60,126,126,255,255
 950 VDU23,227,24,60,126,255,255,126,60,24
 960 VDU23,228,255,126,60,24,24,60,126,255
 970 VDU23,229,24,24,0,0,0,0,0,0
 980 ENVELOPE1,2,-10,-5,-2,2,3,4,0,0,0,0,0,0
 990 DIMcol%(63),shapeX(63),flagX(63),name$(2)
1000 ENDPROC
1010 DEFPROCinit
1020 FORcell%=0TO63
1030 col%(cell%)=RND(4):shapeX(cell%)=224+RND(4):flagX(cell%)=0
1040 NEXT
1050 posoneX=0:postwoX=63
1060 flagX(posoneX)=1:flagX(postwoX)=1
1070 scoreoneX=0:scoretwoX=0
1080 moveX=0
1090 newposX=0:newposX=0
1100 *FX11,0
1110 *FX4,2
1120 *KEY12"L"
1130 *KEY13"R"
1140 *KEY14"D"
1150 *KEY15"U"
1160 ENDPROC
1170 DEFPROCinstruct
1180 VDU19,0,4,0,0,0
1190 VDU23;8202;0;0;0;
1200 VDU28,10,3,30,0
1210 PRINT''"THE ATTRIBUTES
```

```
TRAIL"'''''''''''''''''''''''''''
'''
 1220 VDU28,1,24,39,4
 1230 PRINTTAB(2,14)"Use a
name of 7 letters or less."
 1240 FORNX=1TO2
 1250 PRINTTAB(0,2+NX^2)"Pl
ayer ";NX;". Please type in
 your name."'"Then press RE
TURN."'
 1260 name$(NX)=""
 1270 REPEAT
 1280 get=GET
 1290 IF LEN(name$(NX))=0 A
ND get>90 get=get-32 ELSE I
F LEN(name$(NX))=0 GOTO1300
 1300 IF get=127 THEN VDU12
7:name$(NX)=LEFT$(name$(NX)
,(LEN(name$(NX))-1)):GOTO12
80
 1310 IF(RIGHT$(name$(NX),1
)="."OR RIGHT$(name$(NX),1)
=" ") AND get>90 get=get-32
 ELSE IF(RIGHT$(name$(NX),1
)="."OR RIGHT$(name$(NX),1)
=" ")GOTO1330
 1320 IF LEN(name$(NX))>0 A
ND get)46AND get<97 get=get
+32
 1330 PRINTCHR$(get);:name$
(NX)=name$(NX)+CHR$(get):UN
TILget=13 OR LEN(name$(NX))
=8
 1340 name$(NX)=LEFT$(name$
(NX),LEN(name$(NX))-1)
 1350 NEXT
 1360 PROCcont
 1370 PRINT;name$(1);" star
ts with a star at the"'"bot
tom left of the grid."'name
$(2);" has a star at the to
p right"'"of the grid. When
 it's your turn,"'"your nam
e and star will flash."
 1380 PRINT'"Each player ta
kes a turn to move their"'"
star one position up, down,
 left or"'"right. This can
be done by entering"'"the f
irst letter of the word or
the"'"arrow keys may be use
d instead."
 1390 PRINT'"The aim of the
game is to score as"'"many
 points as possible by tryi
ng"'"to move to a new squar
e with the"'"same shape and
 colour as the square"'"you
 leave."
 1400 PROCcont
 1410 PRINT'"The scores are
as follows:-"'"3...for mo
ving to a new square which"
'"has a symbol of the same
shape"'"and colour as the o
ne you have left."
 1420 PRINT'"2...if you man
age to match just the"'"sha
pe or the colour."
 1430 PRINT'"1...if you mov
e to a new square"'"which d
oes not match your last one
"'"at all."
 1440 PROCcont
 1450 PRINT"No square on th
e grid may be visited"'"twi
ce. A marker stays in each
square"'"visited."
 1460 PRINT'"If you attempt
 an illegal move, you"'"wil
l hear a wobbly noise and l
oose"'"your turn."
 1470 PRINT'"Each player ha
s twenty moves in"'"which t
o earn as many points as"'"
possible."
 1480 PRINT'"Scores are sho
wn below the grid."
 1490 PROCcont
 1500 PRINT'"You may set th
e time allowed for each"'"m
ove. Enter the number of se
conds.":INPUTwaitX:waitX=wa
itX*100
 1510 IF waitX>5000 waitX=5
000
 1520 IF waitX<500 PRINT"T
hat would be rather fast. P
lease"'"enter at least 5 se
conds.":PROCdelay:CLS:GOTO1
500
 1530 PRINT''"You may add t
o the difficulty of the"'"g
ame by making it illegal to
 move"'"to a square of the
same colour as"'"your oppon
ent. Press D if you want"'"
this option else any other
letter."
 1540 *FX202,32
 1550 G$=GET$:IFG$="D" diff
icultX=1 ELSEdifficultX=0
 1560 PROCcont
 1570 ENDPROC
 1580 DEFPROCdelay:TIME=0:R
EPEATUNTILTIME>300:ENDPROC
 1590 DEFPROCcont
 1600 PRINTTAB(1,19)"Press
the space bar to continue."
 1610 REPEATUNTILGET=32:CLS
 1620 ENDPROC
 1630 DEFPROCend
 1640 *FX15,0
 1650 VDU23;8202;0;0;0;
 1660 VDU19,2,4,0,0,0,19,3,
3,0,0,0
 1670 PROCcircle(300,600,20
0,3)
```



Attributes Trail listing

From Page 19

```
1680 PROCcircle(900,600,20
0,3)
1690 PROCcircle(200,650,50
,2)
1700 PROCcircle(400,650,50
,2)
1710 PROCcircle(800,650,50
,2)
1720 PROCcircle(1000,650,5
0,2)
1730 PROCcircle(300,600,40
,1)
1740 PROCcircle(900,600,40
,1)
1750 PROCsmile(300)
1760 IF scoreone%=scoretwo
% PROCsmile(900) ELSE PROCs
ad
1770 IF scoreone%>scoretwo
% PRINTTAB(2,22);name$(1)TA
B(2,24)"scored"TAB(2,26);sc
oreone% ELSE PRINTTAB(2,22)
;name$(2)TAB(2,24)"scored"T
AB(2,26);scoretwo%
1780 IF scoreone%>scoretwo
% PRINTTAB(12,22);name$(2)T
AB(12,24)"scored"TAB(12,26)
;scoretwo% ELSE PRINTTAB(12
,22);name$(1)TAB(12,24)"sco
red"TAB(12,26);scoreone%
1790 PRINTTAB(3,29)"SPACE
TO PLAY"
1800 REPEATUNTILGET=32
1810 ENDPROC
1820 DEFPROCcircle(X%,Y%,r
ad%,col%)
1830 VDU29,X%;Y%;
1840 GCOL0,col%
1850 MOVE0,rad%
1860 FORangle%=0TO360STEP2
0
1870 up%=SINRAD(angle%)*ra
d%
1880 across%=COSRAD(angle%
)*rad%
1890 MOVE0,0:PLOT85,up%,ac
ross%
1900 NEXT
1910 ENDPROC
1920 DEFPROCsmile(X%)
1930 VDU29,X%;600;
1940 GCOL0,1
1950 rad%=150
1960 MOVESINRAD(110)*150,C
OSRAD(110)*150
1970 FORangle%=110TO250STE
P10
1980 up%=SINRAD(angle%)*ra
d%
1990 across%=COSRAD(angle%
)*rad%
2000 DRAWup%,across%
2010 NEXT
2020 ENDPROC
2030 DEFPROCsad
2040 VDU29,900;400;
2050 GCOL0,0
2060 rad%=150
2070 MOVESINRAD(300)*150,C
OSRAD(300)*150
2080 FORangle%=300TO420STE
P10
2090 up%=SINRAD(angle%)*ra
d%
2100 across%=COSRAD(angle%
)*rad%
2110 DRAWup%,across%
2120 NEXT
2130 ENDPROC
2140 MODE6
2150 VDU19,0,4;0;
2160 REPORT:PRINT" at line
";ERL
2170 *FX12
2180 *FX4,0
2190 END
2200 REM downloader
2210 *KEY0 *T.|MD%=PAGE-&E
00:FORI%=PAGE TO TOP STEP4:
!(I%-D%)=!I%:NEXT:!(TOP-D%)
=&FF0D:PAGE=&E00|MOLD|MRUN|
M
2220 *FX138,0,128
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

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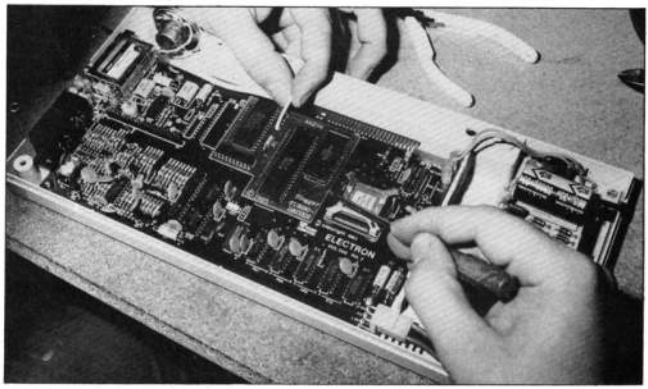


Putting Electron into turbo-drive

Product: Elk Turbo Driver
Price: £42 (fitted) £29.95 (kit)
Supplier: Slogger, 107 Richmond Road, Gillingham, Kent. Tel: 0634 52303

ROLAND WADDILOVE looks at the exciting potential of Slogger's Elk Turbo-Driver

THE Electron has acquired an unfortunate reputation as being a slow micro, but this actually isn't so. For instance it's much faster than its competitor, the Sinclair Spectrum.

This misconception has arisen through living in the shadow of its big brother, the BBC Micro. Any home computer compared with this will seem slower.

This won't placate Electron users though – they want their machine to be every bit as good as the BBC Micro. Now Slogger has come to the rescue and you can give your Electron a big boost in speed with an Elk Turbo-Driver.

The Turbo-Driver is a small board which fits inside the Electron. Apart from a switch on the side of the case there's no indication that it's there. Flick the switch up and you're in turbo mode, flick it down and you're back to normal.

The board plugs into the 6502 processor and Basic sockets on the main circuit board. It's quite easy to fit to very early Electrons since both chips are simply plugged into their sockets.

Most Electrons however have the chips soldered in and getting them out isn't too easy. Send your machine to Slogger and they will fit the board and return it within seven days – quite an impressive service.

So how good is the Turbo-Driver? In Table I you'll see the results of five speed tests when run on a standard Electron, Turbo Electron and BBC Micro.

Test 1 is a simple maths program calculating SIN, COS and TAN. The BBC Micro comes out on top as you'd expect, but the Turbo is a very close second with the standard Electron taking half as long again, so there's a significant increase in speed.

Test 2 is the same as Test 1, the only difference being that Test 1 was run in Mode 6 and Test 2 in Mode 1.

The results clearly show a drastic reduction in the performance of the standard Electron. It ran almost three times slower than the BBC Micro and Turbo, which were unaffected by the mode change.

Tests 3 and 4 are again identical, except that Test 3 runs in Mode 6 and Test 4 in Mode 1. An array is dimensioned and filled with a value. Notice that the BBC Micro is again quickest, with the Turbo close behind, and that there's little difference between Mode 6 and 1. The standard Electron is only slightly slower in Mode 6, but again it's three times slower in Mode 1.

Test 5 is a graphics program running in Mode 2. The BBC Micro easily wins with the Turbo not far behind. The standard Electron is three times slower, as before.

These simple tests clearly show that a BBC Micro is still slightly faster than a Turbo Electron, although you probably won't notice the difference.

The speed increase over a standard Electron varies depending on what it is doing and in which mode it is running. You'll see the biggest difference in Modes 0 to 3,

Test	Standard Electron	Turbo Electron	BBC Micro
1	16.42	11.06	10.05
2	41.49	11.06	10.05
3	11.73	8.23	7.37
4	29.35	9.31	7.38
5	22.85	7.73	4.9

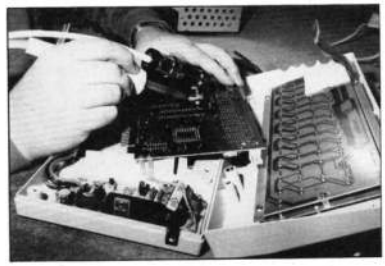
Table I: Results of the speed tests in seconds

Benchmarks are all well and good, but they don't tell the whole story. What is the Turbo like in normal use? A common question we get asked is: "If I buy the Slogger Turbo will I be able to run all BBC software as long as it doesn't use Mode 7?" The answer to this is definitely no.

All the Turbo does is to speed up the Electron – nothing more, nothing less. If a game doesn't run on a standard Electron it won't run on a Turbo Electron either.

If a BBC game crashes after running for one minute on a standard Electron it will crash after 20 seconds on a Turbo Electron because it's running three times faster.

However, much Electron software is improved and given new life by the boost in speed supplied by the Turbo. It puts extra zip into the cars in Frogger, the aliens are meaner in Space Invaders and the ghosts in Pac Man seem jet propelled.



Some games are simply too fast now. Alligator's Blagger and Tynesoft's Mousetrap are unplayable. This is why there's a switch on the side of the Electron to set it back to normal speed.

Aardvark's Frak! and one or two other games still run at the same speed and the Turbo makes no difference at all.

Some BBC software does work on the standard Electron, but the games run so slowly they aren't much fun at all. For instance Ghouls of Azzod, Morris Minor and USS Endeavour are three superb games from recent issues of *The Micro User* that all run on the Electron.

However they're so slow I can't imagine anyone wanting to play them. All these games run at their normal speed on a Turbo Electron and are great fun to play.

So it's fair to say that the Turbo instantly increases the amount of software available for the Electron, though it doesn't turn your Electron into a BBC Micro.

To sum up, the Turbo-Driver increases the speed of the Electron by up to 300 per cent depending on what it is doing. Much Electron software benefits by the increase in speed and the Turbo can be switched off for the rest. BBC Micro software which runs but is unplayable because of its slow speed now runs at the proper speed.

Having used a Turbo Electron I can't bear the thought of going back to my old slow version. This upgrade should have been standard on all Electrons. I'd like to know why Acorn didn't think of this when it was designing the original.

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Now pay attention WHILE we WEND our way towards a most useful facility

By ROBIN NIXON

NOW that we've got the hang of creating and using our own Basic keywords, let's round off this series by implementing the powerful WHILE . . . WEND facility that BBC Basic lacks.

You will probably be familiar with FOR . . . NEXT and REPEAT . . . UNTIL loop structures, having used them several times in most of your programs.

But have you ever felt that neither FOR . . . NEXT nor REPEAT . . . UNTIL were quite what you wanted for a particular piece of code?

Sometimes you need a little extra. To see why, let's have a quick look at these two structures.

FOR . . . NEXT is a loop that will execute a fixed number of times. For example, the following program will loop exactly 100 times:

```
10 FOR X=1 TO 100
20 PRINT X
30 NEXT X
40 END
```

This is all very well unless you want to be able to break out of the loop for any reason. Perhaps you want the user to have the option of pressing the spacebar to stop. You could allow for this in the following way but it is sloppy programming:

```
10 FOR X=1 TO 100
20 PRINT X
30 IF INKEY$(0)=" "
THEN X=100
40 NEXT X
50 END
```

Obviously the way we get round this on the BBC Micro is to use a REPEAT . . . UNTIL loop, as in the following:

```
10 X=0
20 REPEAT X=X+1
30 PRINT X
40 UNTIL X=100 OR
INKEY$(0)=" "
50 END
```

Yet there is still a limitation here. Supposing you hold the spacebar down right from the start of program execution. No matter what we do *X* will still reach a value of 1 which will be printed out.

Admittedly you would have to have fast reflexes to hit the spacebar immediately after running the program, but this is only an example. Anyway, how could we stop this happening?

This is where WHILE . . . WEND comes into its own. Have a look at this program:

```
10 X=0
20 WHILE X<100 AND
INKEY$(0)<>" "
30 X=X+1
40 PRINT X
50 WEND
60 END
```

The difference between this and a REPEAT . . . UNTIL loop is that the condition is checked before the instructions inside the loop are executed rather than after.

So if the condition after the WHILE in line 20 is true the instructions inside the loop will be executed, and if the condition is false program execution will jump to the next WEND.

In many cases you want a number of things to happen when a certain condition is true. In Fortran you would use IF and END IF. This is similar to Basic's IF, except that if the condition following the IF is true all instructions following it are executed until an END IF is encountered.

So you can see that WHILE . . . WEND can be used as a multi-line IF, for example:

```
10 X=0
20 Y=100
30 Z=1000
40 WHILE X<100 AND Y>50
AND Z<1200
50 X=X+1
60 Y=Y-1
70 Z=Z+2
80 PRINT X,Y,Z
90 WEND
100 END
```

Lines 50-80 could have been made into a multi-statement line, but I think it is easier to follow a program which has as few multi-statement lines as possible.

You might argue that you could use the following structure putting the statements to be executed in PROCb, as below:

```
IF a THEN PROCb
```

You would be right, but then, that would be your personal choice. If I were debugging a program with a large number of procedures in it I would have to keep going backwards and forwards to follow the flow of the program. Using WHILE . . . WEND the program flow is kept up.

I am not saying that you could or should replace all procedures with WHILE . . . WEND as, for example, you would not have local variables or be able to pass parameters.

But careful use of WHILE . . . WEND can make programs easier to write and to follow. The actual decision whether to call a separate procedure or simply code through is more a matter of art than science.

To use WHILE . . . WEND in your programs type in the listing of that name and then save it. When you run it it assembles the object code at &B00 which is then saved to tape or disc as a file called WW. To use this in future type:

```
*RUN WW
```

By the way, with this utility you can't have nested WHILE . . . WEND loops. But to make up for this if you use WHILE . . . WEND in a program and press Escape you can go back to the last WHILE statement by simply typing WEND.

Thus you have the added bonus of something similar to CONT (or continue) which the BBC Micro does not have.

Now to how it works. Lines 100 to 1490 will be familiar from my last article. They trap the Break (BRK) vector and check whether one of our new keywords has caused the error.

Lines 1530 to 1590 contain the new keyword table

which holds the keywords and action addresses of WHILE and WEND.

Lines 1630 to 1810 store the present position of PTRA when a WHILE is encountered. This is to enable us to continue execution at this position at a later point.

Lines 1850 to 1960 use a ROM routine – the one used by EVAL – to test the condition following the WHILE.

If it is true execution jumps to *true*.

If the condition is not true lines 2000 to 2130 look for a matching WEND.

When it has been found, the location following it is stored so that program execution is made to continue from there.

If the condition following the WHILE was true lines 2170 to 2230 set PTRA to the start of the lines between the WHILE and WEND, which must now be interpreted.

Thereafter whenever a WEND is encountered lines 2270 to 2430 force execution to jump to the condition following the last WHILE and evaluate it – we've already stored this in lines 1630 to 1810. Thus the process continues, jumping back to test the conditions following each WHILE whenever a WEND is found, until finally that condition is not true, when we drop out of the loop.

This is the last in the present series. I hope you have found it useful and look forward to seeing any extra keywords and routines you come up with.

```
100 REM ******************
110 REM *                *
120 REM *  WHILE..WEND   *
130 REM *                *
140 REM *  By  Robin     *
150 REM *      Nixon     *
160 REM *                *
170 REM * (c) Electron   *
180 REM *      User      *
190 REM *                *
200 REM ******************
210 REM
220 MODE 6
230 oswrch=&FFEE
240 osbyte=&FFF4
250 checkend=&9857
260 continue=&8B9B
270 evalexpr=&9B29
280 FOR PASS=0 TO 3 STEP3
290 P%=&B00
300 [
310 OPT PASS
320 \
330  .start
340 \
350 LDA &202
360 LDX &203
370 CMP #main MOD &100
380 BNE changebrkvector
390 CPX #main DIV &100
400 BEQ alreadychanged
410 \
420 .changebrkvector
430 \
440 STA &70
450 STX &71
460 LDA #main MOD &100
470 STA &202
480 LDA #main DIV &100
490 STA &203
500 \
510 .alreadychanged
520 \
530 RTS
540 \
550 .main
560 \
570 PHP
580 PHA
590 TYA
600 PHA
610 TXA
620 PHA
630 LDY #0
640 LDA (&FD),Y
650 CMP #4
660 BEQ checkcommand
670 \
680 .notcommand
690 \
700 PLA
710 TAX
720 PLA
730 TAY
740 PLA
750 PLP
760 JMP (&70)
770 \
780 .checkcommand
790 \
800 LDA &A
810 CLC
820 ADC &B
830 STA &80
840 LDA &C
850 ADC #0
860 STA &81
870 SEC
880 LDA &80
890 SBC #1
900 STA &80
910 LDA &81
920 SBC #0
930 STA &81
940 LDA #keytable MOD&100
950 STA &82
960 LDA #keytable DIV&100
970 STA &83
980 \
990 .comploop
1000 \
1010 LDY #0
1020 \
1030 .comploop1
1040 \
1050 LDA (&82),Y
1060 BEQ found
1070 CMP #58
1080 BEQ notcommand
1090 CMP (&80),Y
1100 BNE next
1110 INY
1120 JMP comploop1
1130 \
1140 .next
1150 \
1160 JSR incmatch
1170 BNE next
1180 JSR incmatch
1190 JSR incmatch
1200 JSR incmatch
1210 JMP comploop
1220 \
1230 .found
1240 \
1250 STY &86
1260 INY
1270 LDA (&82),Y
1280 STA &84
1290 INY
1300 LDA (&82),Y
1310 STA &85
1320 LDA #(quit-1) DIV&100
1330 PHA
1340 LDA #(quit-1) MOD&100
1350 PHA
1360 JMP (&84)
1370 \
1380 .incmatch
1390 \
1400 LDA &82
1410 CLC
1420 ADC #1
1430 STA &82
1440 LDA &83
1450 ADC #0
1460 STA &83
1470 LDY #0
1480 LDA (&82),Y
1490 RTS
1500 \
1510 .keytable
1520 \
1530 EQUS "WHILE"
1540 EQUB 0
1550 EQUW while
1560 EQUS "WEND"
1570 EQUB 0
1580 EQUW wend
1590 EQUB 58
1600 \
1610 .while
1620 \
1630 LDX #1
1640 STX &86
1650 DEX
1660 \
1670 .incwhile
1680 \
1690 JSR get
1700 INX
1710 CPX #4
1720 BNE incwhile
1730 LDA &A
1740 STA &1B
1750 STA &8D
1760 LDA &B
1770 STA &19
1780 STA &8E
1790 LDA &C
1800 STA &1A
1810 STA &8F
1820 \
1830 .while1
```

Extra Commands listing

From Page 27

```
1840 \
1850 JSR evalexpr
1860 LDA &2A
1870 BNE true
1880 LDA &1B
1890 CLC
1900 ADC &19
1910 STA &B
1920 LDA &1A
1930 ADC #0
1940 STA &C
1950 LDA #0
1960 STA &A
1970 \
1980 .findwend
1990 \
2000 JSR get
2010 CMP #ASC"W"
2020 BNE findwend
2030 JSR get
2040 CMP #ASC"E"
2050 BNE findwend
2060 JSR get
2070 CMP #ASC"N"
2080 BNE findwend
2090 JSR get
2100 CMP #ASC"D"
2110 BNE findwend
2120 INC &A
2130 RTS
2140 \
2150 .true
2160 \
2170 LDA &1B
2180 STA &A
2190 LDA &19
2200 STA &B
2210 LDA &1A
2220 STA &C
2230 RTS
2240 \
2250 .wend
2260 \
2270 LDX #1
2280 STX &86
2290 DEX
2300 \
2310 .incwend
2320 \
2330 JSR get
2340 INX
2350 CPX #3
2360 BNE incwend
2370 LDA &8D
2380 STA &1B
2390 LDA &8E
2400 STA &19
2410 LDA &8F
2420 STA &1A
2430 JMP while1
2440 \
2450 .get
2460 \
2470 LDA &B
2480 CLC
2490 ADC #1
2500 STA &B
2510 LDA &C
2520 ADC #0
2530 STA &C
2540 LDY #0
2550 LDA (&B),Y
2560 RTS
2570 \
2580 .quit
2590 \
2600 DEC &86
2610 LDA &86
2620 CLC
2630 ADC &A
2640 STA &A
2650 JSR checkend
2660 PLA
2670 PLA
2680 PLA
2690 PLA
2700 PLA
2710 PLA
2720 PLA
2730 PLA
2740 PLA
2750 JMP continue
2760 ]
2770 NEXT
2780 OSCLI ("*SAVE WW "+ST
R$"start+" "+STR$"PZ)
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

SNAP DRAGON

By PHILIP ORD and KEITH OWENS

SNAP Dragon, a card game based on that old favourite Snap, is full of fun and excitement for youngsters.

The cards are placed one by one on the table. When the top two cards match hit your key before your opponent can press his.

If you beat him the door to your pet dragon's cave is raised a little. If you're not quick enough your opponent gains the advantage instead.

After winning several times the door will be high enough for one of the dragons to emerge. He'll race out and destroy the opposing player.

Are your reactions fast enough to avoid the fiery fate that awaits you?

The keys are Z for player 1 and / for player 2.

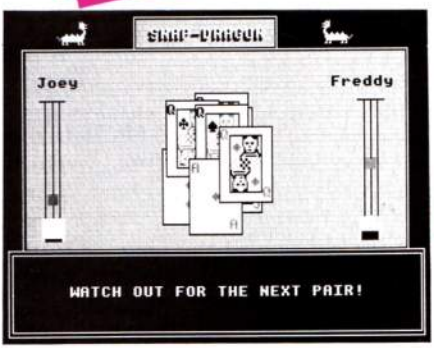
The program is fairly long for a Mode 1 game, so leave out all unnecessary spaces when entering the listing or you'll run out of memory. The space following the line number isn't needed so miss it out.

MAIN VARIABLES

X1%,Y1%	Player 1's lift coordinates.
X2%,Y2%	Player 2's lift coordinates.
X%,Y%	Graphics window coordinates for card background, colour.
GC	Court card colours.
C	Card value.
SUIT	Card suit.
da%	Card counter.
D1%,D2%	Dragon's cave coordinates.

PROCEDURES

setup	Inputs players' names and sets up screen.
chars	Defines characters and deletes flashing cursor.
init	Sets initial values for all variables used.
select_card	Uses information from PROCdata to select card and suit. Also defines correct colours.
shuffle	Shuffles the deck after every 52 cards.
key	Tests for keypress and acts accordingly.
snap1	If keypress is valid, moves lift of player 1 and enlarges left hand cave entrance.
snap2	Moves lift of player 2 and enlarges right hand cave entrance.
invalid	If cards do not match when key is pressed a warning message is printed.
display	Creates random colour and sound display.
win	Congratulates winner and offers a new game.
data	Generates a random number between 1 and 52 inclusive to produce from the data statements, a different card and suit value.



Full listing starts on Page 30

From Page 29

```
  10 REM Snap Dragon
  20 REM By P.Ord/K.Owens
  30 REM (c) Electron User
  40 IF PAGE>&E00 GOTO1410
  50 DIM N%(52),C(52),SUIT
(52):*FX16
  60 MODE1:VDU23,1,0;0;0;0
;:VDU7:PRINTTAB(10,16)"INST
RUCTIONS Y or N?":K$=GET$:I
F K$<>"Y" AND K$<>"N" GOTO6
0
  70 CLS:IF K$="Y"PROCinst
:CLS:VDU20
  80 I%=0:PROCdragon:VDU5:
MOVE160,852:VDU224,225,226,
8,11,227:MOVE960,852:VDU11,
228,8,10,229,230,231
  90 PROCchars:N=0
 100 PROCinit:PROCdata:PRO
Cset_up:GOTO230
 110 DEF PROCset_up
 120 MOVE54,256:DRAW54,810
:DRAW1223,810:DRAW1223,256:
DRAW54,256:MOVE10,22:DRAW10
,256:DRAW1270,256:DRAW1270,
22:DRAW10,22:MOVE20,32:DRAW
20,246:DRAW1260,246:DRAW126
0,32:DRAW20,32:MOVE395,812:
DRAW395,898:DRAW826,898:DRA
W826,812
 130 VDU19,2,2;0;:VDU24,48
0;817;816;888;:GCOL0,130:CL
G
 140 X=432:Y=856:FOR I=1 T
O 10:X=X+1:Y=Y+1:MOVEX,Y:GC
OL0,0:PRINT"SNAP-DRAGON":NE
XT:MOVEX,Y:GCOL0,3:PRINT"SN
AP-DRAGON"
 150 VDU4:VDU28,1,29,38,25
:COLOUR128:CLS:VDU5:VDU24,6
4;264;1213;880;:GCOL0,130:C
LG
 160 IF N=0 MOVE96,600:CLG
:VDU7:INPUT"WHAT IS YOUR NA
ME PLAYER 1"N1$:MOVE96,500:
VDU7:INPUT"WHAT IS YOUR NAM
E PLAYER 2"N2$:CLG
 170 GCOL0,0:MOVE166,350:D
RAW166,670:MOVE123,350:DRAW
123,670:MOVE1088,350:DRAW10
88,670:MOVE1131,350:DRAW113
1,670:MOVE185,670:DRAW183,6
70:MOVE1070,670:DRAW1148,67
0
 180 MOVE144,670:DRAW144,3
82:MOVE1109,670:DRAW1109,38
2:MOVEX1%,Y1%:VDU18,0,1,228
:MOVEX2%,Y2%:VDU228
 190 A%=1181-(LEN(N2$)*32)
 200 GCOL0,0:MOVE96,735:PR
INT;N1$:MOVEA%,735:PRINT;N2
$
 210 VDU24,115;286;179;346
;:GCOL0,131:CLG:VDU24,1075;
286;1139;346;:CLG
 220 ENDPROC
 230 VDU4:CLS:VDU7:PRINTTA
B(1,2)"PRESS THE SPACEBAR T
O START THE DEAL":REPEAT UN
TIL GET=32:CLS
 240 PROCprint:PROCselect_
card:PROCcard:PROCkey:GOTO2
40
 250 DEFPROCchars
 260 VDU23,224,54,127,127,
127,62,28,8,8,23,225,8,28,2
8,107,127,107,8,28,23,226,8
,28,62,127,62,28,8,8,23,227
,8,28,62,127,127,127,28,62
 270 VDU23,228,255,255,255
,255,255,255,255,255,23,229
,8,94,82,82,82,82,82,94,23,
231,254,252,8,232,72,8,24,1
6
 280 VDU23,232,60,255,63,2
55,252,120,64,192,23,233,64
,223,192,111,56,56,16,16,23
,234,1,243,6,252,24,216,8,1
36,23,235,32,34,39,32,32,60
,62,0
 290 VDU23,236,132,36,116,
4,4,28,60,0,23,237,16,32,64
,255,64,32,16,0,23,238,8,4,
2,255,2,4,8,0,23,239,16,19,
48,47,32,59,196,223
 300 VDU23,240,31,28,159,2
25,7,188,65,241,23,241,12,1
2,51,51,204,204,51,51,23,24
2,204,204,51,51,204,204,48,
48,23,243, 143,130,189,224,
135,232,249,56
 310 VDU23,244,251,35,220,
4,246,12,200,8,23,245,8,24,
16,18,23,16,63,127,23,246,1
36,140,132,36,116,4,254,255
,23,247,0,60,56,32,32,46,36
,33
 320 VDU23,248,0,124,60,4,
4,220,68,4,23,249,17,16,27,
24,63,96,207,128,23,250,8,8
,156,28,246,3,251,2,23,251,
3,2,14,63,255,254,254,60
 330 VDU23,252,90,90,126,2
4,24,60,36,36,23,253,255,12
7,32,46,36,33,49,17,23,1,0;
0;0;0;
 340 ENDPROC
 350 DEFPROCinit
 360 X1%=128:X2%=1093:Y1%=
382:Y2%=382:daZ=0:D1%=286:D
2%=286
 370 ENVELOPE1,1,18,3,3,15
,1,19,126,0,0,-126,126,126:
ENVELOPE2,1,6,4,6,6,2,6,126
,0,0,-126,126,126:ENVELOPE3
,1,19,-4,8,3,13,20,126,0,0,
-126,126,126:ENVELOPE4,1,29
,3,3,13,20,48,126,0,0,-126,
126,126
 380 ENVELOPE5,1,1,-8,8,18
,5,-11,126,0,0,-126,126,126
 390 ENDPROC
 400 DEFPROCselect_card
 410 daZ=daX+1:IF daX>52 P
ROCshuffle:daZ=0:PROCdata:G
OTO240
 420 C=C(N%(daX)):SUIT=SUI
T(N%(daX)):suit$=CHR$(SUIT+
223)
 430 IFSUIT=1ORSUIT=3colou
r=1:GC=0ELSEIFSUIT=2ORSUIT=
4colour=0:GC=1
 440 X%=448+(RND(20)*10):Y
%=688-(RND(20)*10):VDU5:GCO
L0,colour
 450 VDU24,X%;Y%-197;X%+16
0;Y%+10;:GCOL0,131:CLG:GCOL
0,0:MOVEX%,Y%+10:DRAWX%+160
,Y%+10:DRAWX%+160,Y%-197:DR
AWX%,Y%-197:DRAWX%,Y%+10:GC
OL0,colour
 460 ENDPROC
 470 DEF PROCshuffle
 480 VDU7:VDU24,455;298;85
0;695;:GCOL0,130:CLG:VDU4:P
RINTTAB(2,2)"HANG ON WHILE
I SHUFFLE THE CARDS":FOR D=
1 TO 1000:NEXT:SOUND0,3,200
,40:SOUND0,0,0,10:SOUND0,3,
200,40:FOR D=1 TO 2500:NEXT
:CLS:VDU5
 490 ENDPROC
 500 DEF PROCkey
 510 VDU24,64;320;1213;800
;:*FX21
 520 W$=INKEY$(50+RND(100)
)
 530 IF W$="Z" N$=N1$:PROC
snap1:IF Y1%)650 PROCdragon
:time=600:PROCdisplay:PROCw
in
 540 IF W$="/" N$=N2$:PROC
snap2:IF Y2%)650 PROCdragon
:time=600:PROCdisplay:PROCw
in
 550 IF W$="" AND C(N%(daX
))=C(N%(daX-1)) THEN VDU4:C
LS:SOUND1,2,25,25:A$="PAY A
TTENTION "+N1$+" AND "+N2$:
PRINTTAB(19-(LENA$/2),1);A$
;TAB(6,3)"YOU'VE JUST MISSE
D A PAIR":FOR D=1 TO 3000:N
EXT:CLS:PROCprint
 560 ENDPROC
```

```
570 DEF PROCsnap1
580 IF C(N%(da%))<>C(N%(da%-1)) THEN PROCinvalid:ENDPROC
590 VDU4:CLS:PRINTTAB(16,2)"SNAP!!":VDU5
600 SOUND1,4,200,40:time=200:PROCdisplay:VDU4:CLS:VDU5
610 GCOL0,1:MOVEX1%,Y1%+32:VDU228:GCOL0,2:MOVEX1%,Y1%:VDU228:Y1%=Y1%+32:MOVE144,670:GCOL0,0:DRAWX1%+16,Y1%:MOVE144,350:DRAWX1%+16,Y1%-32
620 D1%=D1%+5:VDU24,128;286;169;D1%;:GCOL0,128:CLG
630 ENDPROC
640 DEF PROCsnap2
650 IF C(N%(da%))<>C(N%(da%-1)) THEN PROCinvalid:ENDPROC
660 VDU4:CLS:PRINTTAB(16,2)"SNAP!!":VDU5
670 SOUND1,4,200,40:time=200:PROCdisplay:VDU4:CLS:VDU5
680 GCOL0,1:MOVEX2%,Y2%+32:VDU228:GCOL0,2:MOVEX2%,Y2%:VDU228:Y2%=Y2%+32:MOVE1109,670:GCOL0,0:DRAWX2%+16,Y2%:MOVE1109,352:DRAWX2%+16,Y2%-32
690 D2%=D2%+5:VDU24,1088;286;1129;D2%;:GCOL0,128:CLG
700 ENDPROC
710 DEF PROCinvalid
720 SOUND1,2,10,40
730 VDU4:CLS:B$="YOU NEED AN EYE TEST *+N$:PRINTTAB(5,1)"THE LAST 2 CARDS DON'T MATCH"TAB(19-(LEN$/2),3);B$:FORD=1 TO 2000:NEXT:CLS:PROCprint
740 ENDPROC
750 DEF PROCdisplay
760 TIME=0:REPEAT:VDU19,RND(3),RND(14);0;:SOUND1,-15,RND(200),1:UNTIL TIME>time:VDU20,19,2,2;0;
770 FOR D=1 TO 1000:NEXT
780 ENDPROC
790 DEF PROCwin
800 VDU4:CLS:PRINTTAB(11,1)"WELL DONE ";N$;TAB(9,3)"ANOTHER GAME Y or N?"
810 W$=GET$:IF W$<>"Y" AND W$<>"N" GOTO 810
820 IF W$="Y" RUN ELSE CLS:END
830 ENDPROC
840 DEFPROCdata
850 FORI%=1TO52:N%(I%)=I%:NEXT:FORI%=52TO2STEP-1:C%=RND(I%):T%=N%(C%):N%(C%)=N%(I%):N%(I%)=T%:NEXTI%
860 RESTORE
870 FORI=1TO52
880 READC(I),SUIT(I)
890 NEXT
900 ENDPROC
910 DATA1,1,11,1,2,1,11,2,12,2,13,2,3,2,12,3,13,4,2,3,4,2,1,4,3,4,12,1,3,1,1,2,2,2,13,1,12,2,2,3,13,3,11,3,13,4,3,3,12,4,11,4
920 DATA 13,1,11,1,4,1,12,1,11,3,1,3,3,2,13,3,1,3,2,4,4,3,3,4,2,4,2,1,1,1,11,2,3,1,1,2,2,2,13,2,12,3,11,4,1,4,3,3,12,4,4,4
930 DEF PROCprint
940 VDU4:PRINTTAB(5,2)"MATCH OUT FOR THE NEXT PAIR!":VDU5:ENDPROC
950 DEFPROCcard
960 GCOL0,0:MOVEX%,Y%+10:DRAWX%+160,Y%+10:DRAWX%+160,Y%-197:DRAWX%,Y%-197:DRAWX%,Y%+10:GCOL0,colour
970 SOUND&11,-15,RND(200),1
980 IF C=1 GOSUB 1000 ELSE IF C=2 GOSUB 1010 ELSE IF C=3 GOSUB 1020 ELSE IF C=4 GOSUB 1030 ELSE IF C=11 GOSUB 1040 ELSE IF C=12 GOSUB 1050 ELSE IF C=13GOSUB 1060
990 ENDPROC
1000 MOVEX%+128,Y%-155:VDU65:PROC1:MOVEX%+5,Y%:VDU65:RETURN
1010 PROCc:PROC2:RETURN
1020 PROCc:PROC2:PROC1:RETURN
1030 PROCc:PROC3:RETURN
1040 PROCj:RETURN
1050 PROCq:RETURN
1060 PROCk:RETURN
1070 DEF PROCc
1080 MOVEX%+5,Y%:VDU48+C:MOVEX%+123,Y%-160:VDU48+C:ENDPROC
1090 DEF PROC1
1100 MOVEX%+64,Y%-80:PRINTsuit$:ENDPROC
1110 DEF PROC2
1120 MOVEX%+64,Y%-28:PRINTsuit$:MOVEX%+64,Y%-132:PRINTsuit$:ENDPROC
1130 DEF PROC3
1140 MOVEX%+28,Y%-28:PRINTsuit$:MOVEX%+28,Y%-132:PRINTsuit$:MOVEX%+98,Y%-28:PRINTsuit$:MOVEX%+98,Y%-132:PRINTsuit$:ENDPROC
1150 DEF PROCj
1160 MOVEX%+1,Y%:VDU74:MOVEX%+131,Y%-160:VDU74
1170 MOVEX%+65,Y%-14:VDU18,0,6C,253,231,0,8,10,239,240,8,8,8,10,18,0,2,241,18,0,6C,241,8,242,18,0,2,242,8,8,8,10,18,0,6C,243,244,8,8,10,245,246:PROCdraw:ENDPROC
1180 DEF PROCq
1190 MOVEX%+1,Y%:VDU81:MOVEX%+131,Y%-160:VDU81
1200 MOVEX%+65,Y%-14:VDU18,0,6C,247,248,8,8,10,249,250,8,8,8,10,18,0,2,241,18,0,6C,241,8,242,18,0,2,242,8,8,8,10,18,0,6C,233,234,8,8,10,235,236:PROCdraw:ENDPROC
1210 DEF PROCk
1220 MOVEX%+1,Y%:VDU75:MOVEX%+131,Y%-160:VDU75:GOTO1170
1230 DEFPROCdraw
1240 MOVEX%+32,Y%-14:GCOL0,0:DRAWX%+130,Y%-14:DRAWX%+130,Y%-171:DRAWX%+32,Y%-171:DRAWX%+32,Y%-14
1250 GCOL0,colour:MOVEX%+36,Y%-35:PRINT;suit$:MOVEX%+92,Y%-130:PRINT;suit$
1260 ENDPROC
1270 DEF PROCdragon
1280 VDU23,224,1,3,143,95,47,15,9,13,23,225,17,189,255,255,255,255,0,128,23,226,28,184,248,248,240,240,144,216,23,227,80,120,126,120,126,24,12,12
1290 VDU23,228,10,30,118,30,126,24,48,48,23,229,56,29,31,31,15,15,9,27,23,230,136,221,255,255,255,255,0,1,23,231,128,192,241,250,244,240,144,176
1300 IF Z%=0 Z%=1:ENDPROC
1310 VDU24,455;290;850;695;:GCOL0,130:CLG
1320 VDU24,64;264;1213;800;
1330 IF N$=N1$ MOVE232,318:VDU18,0,0,224,225,226,8,11,227:SOUND0,5,2,50:FOR I=1 TO 30:GCOL0,RND(3):MOVE334:DRAWX2%+32,(Y2%+10)-RND(42):NEXT:ENDPROC
1340 IF N$=N2$ MOVE942,318:VDU18,0,8,11,228,8,10,229,230,231:SOUND0,5,2,50:FOR I=1 TO 60:GCOL0,RND(3):MOVE942,334:DRAWX1%,(Y1%+10)-RND(42):NEXT:ENDPROC
1350 DEF PROCinst
1360 VDU19,3,6;0;:COLOUR2:PRINTTAB(14,1)"INSTRUCTIONS":COLOUR3:PRINT''"The cards are dealt onto the table one"''"by one. If any card value is the same as""the previous card, then you must press"
1370 PRINT''"your control key ahead of your opponent."''"If you're successful your lift will move""up, thus enlarging the entrance to the"''"Dragons den."''"When your lift has reached the top of"
1380 PRINT''"its shaft, your Dragon will be released."''"It will then attack your opponents lift"''"and destroy it with its fiery breath."
1390 COLOUR2:PRINT''"CONTROL KEYS:-";:COLOUR1:PRINT" PLAYER 1 ";:COLOUR2:PRINT"Z";:COLOUR1:PRINT" PLAYER 2 ";:COLOUR2:PRINT"/"''TAB(5)"PRESS SPACE-BAR TO CONTINUE";:REPEAT UNTIL GET=32
1400 ENDPROC
1410 REM Relocate
1420 D%=PAGE-&E00:*KEY0 *T.!MFORI%=PAGE TO TOP STEP4:!(I%-D%)=!I%:NEXT:!(TOP-D%)=&FF0D:PAGE=&E00!MOLD!MRUN!M
1430 *FX138,0,128
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

Never before have there been such money-saving offers for readers of a computer magazine!

EXPAND your Electron

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How the Plus 1 helps you r the most of your Electron

With the Plus 1, you and your Electron enter a whole new computing dimension. The Plus 1 turns your Electron into a fully fledged micro capable of using printers, joysticks and cartridge ROMs – the software that comes on a chip. In addition, the Plus 1's analogue to digital port gives access to the outside world – while the slots for the ROM cartridges allow the Electron to take advantage of the latest, most exciting hardware developments yet to be released.

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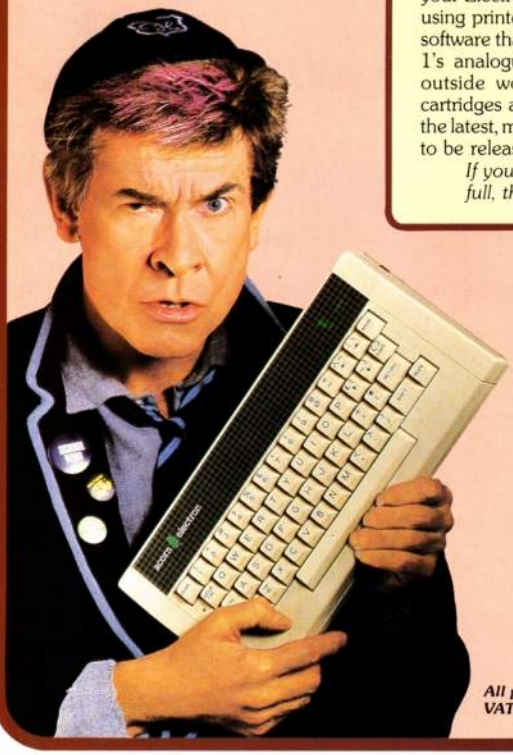

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on Page 61

EXPAND – with the Electron Language Lab

Now you can dramatically extend your programming horizons with this exclusive offer from Electron User. It comes complete with the Plus 1 interface and the Pascal and Logo cartridge ROMs. The Language Lab frees you from the limitations of Basic by giving you the two most educationally favoured high level programming languages – Logo and Pascal.

LOGO: *Acclaimed by teachers, parents and pupils alike, it's the language that's put the fun back into learning the fundamentals of programming. It's simple enough for a child to use, yet complex enough to satisfy the most exacting computer buff.*

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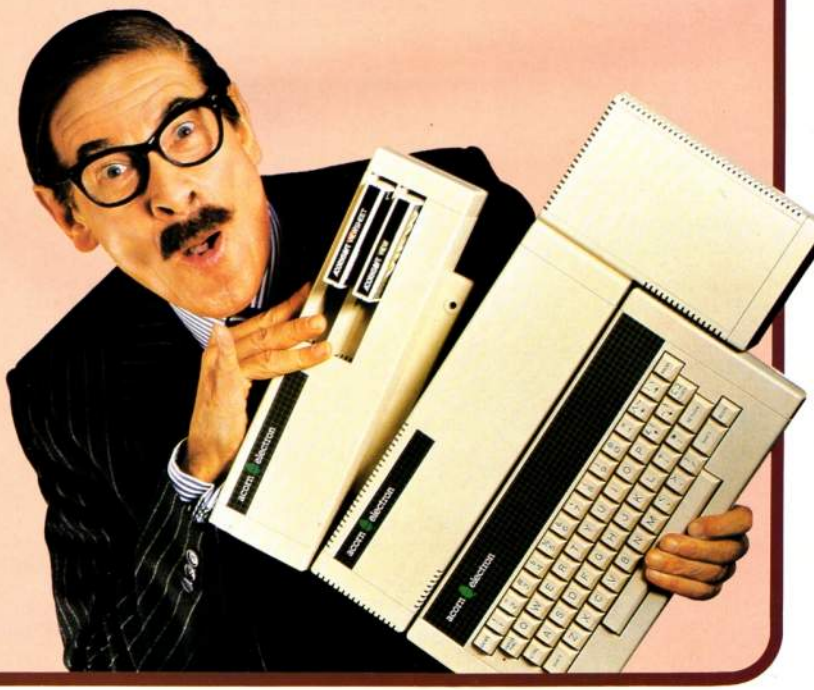


Royal Wedding

By GORDON KEY and DAVID McLACHLAN

TO celebrate the Royal Wedding we've come up with a real teaser – a sliding block puzzle based on the happy occasion.

When you run the program you will be offered a choice of four inbuilt pictures on the wedding theme or of loading a pre-recorded Mode 2 screen of your own. You will then be presented with the complete picture.

Once you've studied it, shuffle the picture by pressing Space and attempt to solve the resultant jumble. The keys you'll need to sort it all out are:

: Move tile up.
/ Move tile down.
X Move tile to right.
Z Move tile to left.

Space can be pressed at any time to further shuffle the tiles. Should you give up, pressing Return will undo all your moves and any entered by Space, and the puzzle will be solved for you in a few seconds provided less than 2000 moves have been made.

Pressing Escape at any time will return you to the menu so that you can select another picture.

The program's operation is quite simple. Two short machine code routines are assembled at &110 and &900.

The first is used to move a block or tile by accessing the screen directly, and the second prints large letters.

The screen is split into 16 equally sized tiles which are numbered from 0 to 15.

Two integer variables, *N%* and *O%*, are then used to pass the new and old tile numbers to the assembly routine via the CALL statement using the parameter block provided in page six by Basic.

The routine also transfers the contents of the first variable to the second.

Each time a tile is moved – including random moves generated by pressing Space – the move is recorded by PROCsave. This stores four moves in a single byte of memory starting at &A00.

Due to this efficient method

of storage almost 2000 moves can be safely stored.

Pressing Return solves the problem by simply reversing all moves until the picture is restored.

If the computer beeps while you are playing, it means that the available storage memory is full and you have two options.

You can either press Return to solve the puzzle, or press C to continue, but note that Return will no longer solve the puzzle as the counter *(H%)* is zeroed.

If you select option 5 in order to load your own Mode 2

VARIABLES

A%	Flag for PROCmove and a CALL variable for PROCbig.
C%	General purpose for colour value.
D%	Start of data storage for saving moves.
E%	Determines souvenir balloon's speed.
F%	Local flag for FNpic5.
H%	Byte pointer for move storage.
I%	Inkey value and secondary counter.
M%	Call address for the machine code routine.
N%	New tile number (the tile that will be moved).
O%	Old tile number (the number of the blank space).
P%	Bit pointer for move storage.
R%	Value for the radius of the circle drawn by PROCc.
!S%	Flag to indicate that at least one move has been saved.
FI%	Number of steps in circle loop.
ST%	Step number.
TY%	Type of circle (filled, not filled, spoked).
COL%	Colour of circle.
c(24)	Cosine array.
s(24)	Sine array.
$D%	Used by FNpic5 for passing strings to the command line interpreter.

picture this should have been previously saved to tape or disc using the command *SAVE filename 3000 +5000.

On selecting this option you are given the choice of entering a filename or a star command.

This facility is useful for cataloguing tape or disc,

changing drives and so on, though take care as some commands could destroy the program (selecting another language for example).

If a disc error occurs this will be displayed for a short period before you are returned to the menu.

When saving your own screen, it is advisable to set up a window using VDU 28,0,31,4,25.

Although this makes reading a little difficult, anything that you type or the computer outputs will print on the part of the screen where the missing tile starts and not destroy your picture.

You should note that due to the length of the program several sections are deleted after use before the main program is run.

It is therefore essential that you do not add any extra spaces as you type it in and save the program before running it.

Also the program is downloaded to &1100 if page is higher. This still allows users of most types of DFS to load their own Mode 2 screens. Unfortunately this does not apply to the ADFS, which cannot be used after a download.

The following function keys are defined and called from within the program:

f0 Downloads the program if necessary.
f1 Deletes all the assembler code.
f2 Deletes the instructions.

Full listing starts on Page 37

PROCEDURES

play The main game repeat loop. Repeats indefinitely until Escape is pressed.

move If *A%* is TRUE this procedure makes the souvenir balloon picture move by redefining the actual colour displayed by colour numbers 1 through 12.

get Gets keyboard input and returns the new title number *(N%)*.

del (D%) A delay procedure that runs independently of TIME.

save(h%) Records each move whether entered from the keyboard or generated by PROCshuffle. Each move is stored as a two bit number thus enabling four moves to be stored per byte.

solve(D%) Solves the puzzle by reversing all moves until the picture is restored.

shuffle c() Randomly shuffles the picture tiles. Draws a circle controlled by the numerous parameters.

grid(gc%) Draws the grid in the colour *gc%* that separates the 16 picture titles and sets the initial values for the puzzle.

title Sets the initial program variables and runs the title sequence.

writeword() Writes *word$* in big letters at *x%,y%*.

f(X%,Y%,C%) Fills an area from *X%,Y%* in the colour *C%*

inst Prints the menu of options, gets the one required and returns a string that tallies with the appropriate picture function.

dim Dimensions and sets the values of the SIN and COSIN arrays used by PROCs.

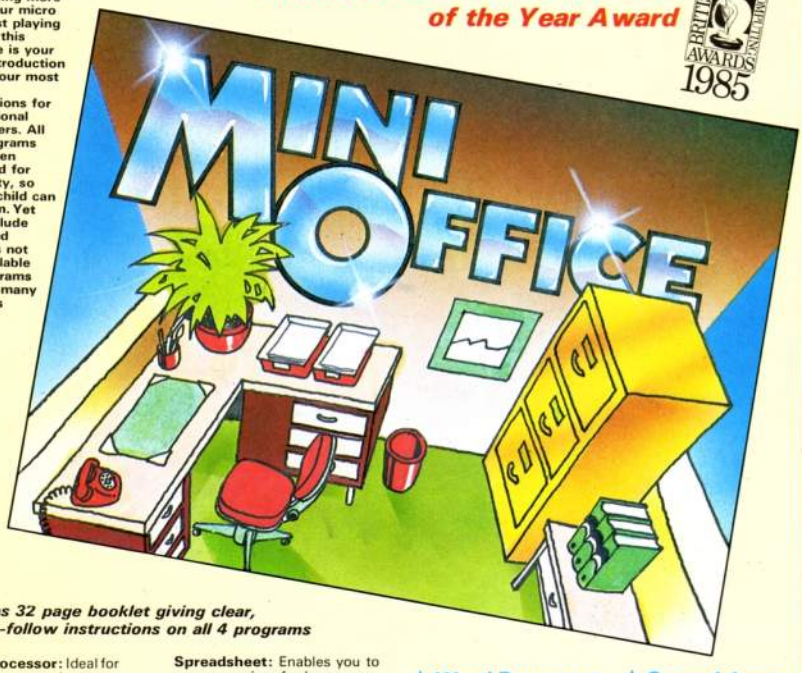
big(A$,X%,Y%,c%) Prints *A$* at *X%,Y%* in colour *c%* and in double height characters.

code The assembly language procedure for moving the tiles.

code2 The assembly language for the big letters routine.

If you want to start doing more with your micro than just playing games, this package is your ideal introduction to the four most popular applications for professional computers. All the programs have been designed for simplicity, so even a child can use them. Yet they include advanced features not yet available on programs costing many times as much!

Finalist for the Home Software of the Year Award



Contains 32 page booklet giving clear, easy-to-follow instructions on all 4 programs

Word Processor: Ideal for writing letters and reports. There is a constant display of both time and word count, plus a words-per-minute display to encourage the budding typist! A unique feature is the double-size text option in both edit and printer mode – perfect for young children and people with poor vision.

Database: You use this for storing information, just like an office filing cabinet. Facts you have entered can be quickly retrieved by just keying in a word or part of a word. They can be sorted, replaced, saved for future use or printed out.

Spreadsheet: Enables you to use your micro for home accounts or pocket money records. It creates a display of numbers in rows and columns. Continuous updating is possible, and a changed figure can be instantly reflected throughout the rest of the spreadsheet. Your results can be saved, to be used for future updates, or can be fed into its associated program . .

Graphics: Part of the spreadsheet section, it lets you draw bar charts, pie charts and histograms to give a graphic presentation of your statistics. Helps to give life and colour to the dullest figures!

Also available from:
BOOTS COMET Currys Dixons WHSMITH
Greens John Menzies RUMBELOWS spectrum *and other computer stores*

☆ Word Processor ☆ Spreadsheet
☆ Database ☆ Graphics

Now they're all together – in ONE simple package

Four full-scale programs for an incredible low, low price! **£5.95** cassette

TO ORDER, PLEASE USE THE FORM ON PAGE 53

Royal Wedding listing

From Page 35

```
  10REM**********************
  20REM*  ROYAL WEDDING  *
  30REM* by Gordon Key & *
  40REM* David McLachlan *
  50REM*(c) Electron User*
  60REM**********************
  65*FX16
  70MODE7:PRINTTAB(12,10)"
Please wait."
  80VDU23;8202;0;0;0;
  90VDU21:*FX5
 100PROCcode:PROCcode2:*FX
21
 110*KEY0FORT%=0TOTOP~PAGE
 STEP4:T%!&1100=T%!PAGE:NEX
T:PAGE=&1100!MO.!MRUN!M
 120*KEY 1DELETE 3320,5110
!MDELETE 10,160!MO.!MRUN!M
 130*KEY2 DELETE 2510,2720
!MDELETE 170,240!MO.!MRUN!M

 140VDU6:PRINTTAB(6,12)"De
leting Asseabler Code":VDU2
1
 150*FX138,0,129
 160END
 170IFPAGE<&1100 THEN 210

 180VDU6:PRINTTAB(12,14)"R
elocating":VDU21
 190*FX138,0,128
 200END
 210VDU6
 220MODE 2
 230CLEAR
 240PROCtitle
 250VDU6
 260*FX21
 270A=GET
 280ONERRORIFERR=17THENCLE
AR ELSE END
 290MODE 7
 300HIMEM=&3000
 310A%=EVAL(FNinst):*FX178
,255,0
 320IF gc%()111 PROCgrid(0
)
 330CLEAR
 340PROCplay
 350END
 360DEFPROCplay
 370REPEAT
 380N%=FNget
 390PROCmove
 400UNTIL0
 410ENDPROC
 420DEFPROCmove
 430IFA%=FALSE ORTIME<E% E
NDPROC
 440VDU19,A%,7;0;:A%=A%MOD
11+1:VDU19,A%,4;0;:TIME=0
 450ENDPROC
 460DEFFNget
 470LOCAL h%
 480N%=O%
 490get=0:IF H%)=500 VDU7:
get=GET:IF get()13 AND get(
)67 THEN 490
 500IF get=67 H%=0 ELSE IF
get=13 PROCsolve(5)
 510IFINKEY(-67)ANDO%MOD4N
%=O%-1:h%=1:I%=-67
 520IFINKEY(-98)ANDO%MOD4(
)3N%=O%+1:h%=2:I%=-98
 530IFINKEY(-105)ANDO%)3N%
=O%-4:h%=3:I%=-105
 540IFINKEY(-73)ANDO%(12N%
=O%+4:h%=4:I%=-73
 550IFINKEY(-74)ANDS% PROC
solve(5)
 560IFINKEY(-99)PROCshuffl
e
 570IFh% PROCs(h%-1):REPEA
T:PROCdel(1):UNTILNOTINKEYI
%
 580*FX21
 590=N%
 600DEFPROCdel(d%)
 610LOCALT%
 620FORT%=0TOd%:PROCmove:N
EXT
 630ENDPROC
 640DEFPROCs(h%)
 650P%=P%+2:IFP%=8:H%=H%+1
:P%=0:H%?7DI%=0
 660hI%=h%+2^P%:H%?7D%=H%?D%
 OR h%:SOUND&10,-15,4,1:S%=
TRUE
 670CALLM%,N%,O%
 680ENDPROC
 690DEFPROCsolve(d%)
 700LOCALh%
 710REPEAT
 720h%=(H%?7D% AND3+2^P%)DI
V2^P%
 730N%=O%+(1-(h%)1)*3)+(1+
((h%ANDI)=1)*2)
 740CALLM%,N%,O%
 750PROCdel(d%)
 760SOUND&10,-15,5,1
 770P%=P%-2:IFP%(0 H%=H%-1
:P%=6
 780UNTILH%=-1
 790S%=FALSE
 800ENDPROC
 810DEFPROCshuffle
 820LOCALf%,g%,h%
 830FORT%=0TO40
 840g%=f%
 850f%=FALSE:REPEAT
 860REPEAT
 870PROCmove
 880h%=RND(4)
 890UNTILh%(>g%
 900IFh%=1ANDO%MOD4:N%=O%-
1:f%=2
 910IFh%=2ANDO%MOD4(>3:N%=
O%+1:f%=1
 920IFh%=3ANDO%)3:N%=O%-4:
f%=4
 930IFh%=4ANDO%(12:N%=O%+4
:f%=3
 940UNTILf%
 950PROCs(h%-1)
 960NEXT
 970ENDPROC
 980DEFFNpic1
 990VDU22,2,23;8202;0;0;0;
1000PROCdim
1010PROCgrid(3)
1020RESTORE 3190
1030GCOL0,7
1040FORL%=1 TO 105
1050READ X%,Y%
1060IF X%=0 AND Y%=0 READ
X%,Y%:MOVE X%-100,Y%
1070DRAW X%-100,Y%
1080NEXT
1090FOR LO=0 TO 420 STEP 4
20
1100RESTORE 3240
1110READ X%,Y%:MOVE X%+LO-
100,Y%
1120FOR LOOP=1 TO 6:READ X
%,Y%:PLOT 1,X%,Y%:NEXT
1130NEXT
1140GCOL 0,7
1150RESTORE 3190
1160FOR L%=1 TO 69
1170READ X%,Y%
1180IF X%=0 AND Y%=0 READ
X%,Y%:MOVE X%+320,Y%
1190DRAW X%+320,Y%
1200NEXT
1210PROCc(340,570,50,24,2,
1,3):PROCc(340,570,25,24,2,
1,1):PROCc(552,390,85,12,1,
2,7):PROCc(552,130,75,12,1,
2,7):PROCc(760,570,50,24,2,
1,3):PROCc(760,570,25,24,2,
1,1):PROCf(550,5,1):PROCf(2
70,900,4)
1220PROCf(415,900,4):PROCf
(685,900,4):PROCf(835,900,4
):PROCf(270,850,4):PROCf(69
0,850,4):PROCf(350,850,4)
1230RESTORE 3250
1240FOR G%=1 TO 8:READ Z:G
COL 0,Z
1250FOR B%=1 TO 4:READ A,B
,C:PLOT A,B,C
1260NEXT:NEXT
1270FOR I=1 TO 20
1280MOVE 1110,200
1290GCOL 0,1:X%=RND(200)+1
000:Y%=RND(200)+200:DRAW X%
,Y%:PROCc(X%,Y%,30,12,2,1,2
)
1300NEXT
1310FOR X=1 TO 25:X%=RND(2
00)+1000:Y%=RND(200)+200:PR
OCc(X%,Y%,30,12,2,1,2):NEXT
1320seagull$=CHR$(230)+CHR
$(231):flap1$=CHR$(234)+CHR
$(232):flap2$=CHR$(235)+CHR
$(233)
1330VDU5:GCOL0,7:MOVE 1024
,896:PRINT seagull$
1340GCOL0,8:MOVE 1024,896:
PRINTflap1$
1350GCOL0,15:MOVE 1024,896
:PRINTflap2$
1360GCOL 0,7:MOVE 1088,736
:PRINTseagull$
1370GCOL 0,15:MOVE 1088,73
6:PRINTflap1$
1380GCOL 0,8:MOVE 1088,736
:PRINTflap2$
1390gc%=111
1400=FALSE
1410DEF PROCf(X%,Y%,C%)
1420yX=Y%
1430GCOL 0,C%
1440REPEAT
1450PLOT 77,X%,Y%
1460Y%=Y%+4
1470UNTIL POINT(X%,Y%)
1480Y%=y%
1490REPEAT
1500PLOT 77,X%,Y%
1510Y%=Y%-4
1520UNTIL POINT(X%,Y%)
1530ENDPROC
1540DEFFNpic3
1550VDU22,2,23;8202;0;0;0;
1560VDU20,1,1,0,0,0,:VDU26
,1279;1023;:VDU19,3,4,0,0,0
,:GCOL 0,129:CLG:GCOL 0,7
1570gc%=0:RESTORE 3270
1580FOR LOOP=1 TO 2
1590FOR LOOP2=1 TO 24
1600READ A,B,C,:PLOT A,B,C
```

→

From Page 37

```
1610NEXT
1620READ D:GCOL 0,D
1630NEXT
1640=FALSE
1650DEFFNpic2
1660VDU22,2,23;8202;0;0;0;
1670GCOL 0,135:CLG
1680PROCdim
1690PROCgrid(0)
1700PROCc(450,700,200,24,1
,1,1)
1710PROCc(840,700,200,24,1
,1,1)
1720MOVE 270,620:DRAW 645,
50:PLOT 85,1025,620
1730DRAW 650,660:PLOT 85,2
70,620
1740L%=&900:?L%=3:L%?1=4:L
%?2=16:L%?3=16
1750CALL (L%+&C2)
1760GCOL0,4
1770PROCwriteword(200,800,
"Andrew")
1780PROCwriteword(565,550,
"&")
1790PROCwriteword(300,300,
"Sarah")
1800gc%=111
1810=FALSE
1820DEF PROCwriteword(x%,y
%,word$)
1830L%!4=x%:L%!6=y%
1840FOR I%=1 TO LEN(word$)
1850L%?&0C=ASC(MID$(word$,
I%,1))
1860CALL (L%+&15)
1870NEXT
1880ENDPROC
1890DEFFNpic4
1900VDU22,2,23;8202;0;0;0;
1910PROCdim
1920VDU19,15,7;0;
1930COLOUR143:CLS
1940FORTX=1TO12
1950GCOL0,TX
1960VDU19,TX,4;0;
1970IX=TX*2
1980PROCc(640+475*c(IX),512
+375*s(IX),100,24,1,1,TX)

1990MOVE640+475*c(IX),512+
375*s(IX):DRAW640,512
2000VDU19,TX,7;0;
2010NEXT
2020VDU19,4,4;0;
2030EX=10:gc%=0
2040=4
2050DEFFNpic5
2060LOCALFX:*FX178,255,0
2070REPEAT
2080FX=FALSE
2090CLS:gc%=0
2100PRINTTAB(0,5)"Please e
nter the required filename"
2110PRINT"or a '*' command
."
2120INPUT$D%
2130IFLEFT$($D%,1)<>"*"$D%
="LOAD "+$D%+" 3000":VDU22,
2,23;8202;0;0;0;:VDU28,0,31
,4,25 ELSEFX=TRUE
2140X%=D%MOD256:Y%=D%DIV25
6:CALL&FFF7
2150=FX21
2160IFFX PRINT''"Please pr
ess space":REPEATUNTILGET=3
2:UNTILFALSE
2170UNTILTRUE
2180=FALSE
2190DEFPROCc(XX,YX,RX,FIX,
STX,TY%,COLX)
2200GCOL 0,COLX
2210IF STX=2 AND FIX=24 FI
X=23
2220LOCALT%
2230MOVEX%,YX
2240FORTX=0TO FIX STEP STX

2250MOVEX%,YX
2260IF STX=2 DRAW X%+c(TX)
*RX,YX+s(TX)*RX
2270IF STX=2 PLOT85,X%+c(T
X+1)*RX,YX+s(TX+1)*RX
2280IF STX=1 AND TY%=1 PLO
T85,X%+c(TX)*RX,YX+s(TX)*RX
2290IF TY%=2 MOVE X%+c(TX)
*RX,YX+s(TX)*RX:DRAW X%+c(T
X+1)*RX,YX+s(TX+1)*RX
2300PLOT85,X%+c(TX)*RX,YX+
s(TX)*RX
2310NEXT
2320ENDPROC
2330DEFPROCgrid(gcX)
2340GCOL0,gc%
2350FORX%=0TO1279STEP320
2360MOVEX%,0
2370DRAWX%,1024
2380NEXT
2390FORY%=0TO1023STEP256
2400MOVE0,Y%
2410PLOT0,0,4
2420PLOT81,1280,-4
2430PLOT81,0,4
2440NEXT
2450IF gc%()0 MOVE 1279,0:
DRAW 1279,1023:DRAW 0,1023
2460GCOL0,128
2470VDU24,0;0;320;256;:CLG
:VDU26
2480M%=-1:P%=6
2490OX=12:SX=FALSE
2500ENDPROC
2510DEFPROCtitle
2520AX=0:VDU23;8202;0;0;0;
2530COLOUR135
2540CLS:VDU19,2,4;0;
2550PROCbig("ROYAL",7,8,2)
2560PROCbig("WEDDING",6,13
,1)
2570PROCdel(100)
2580PRINTTAB(2,19)"By Gord
on Key &"
2590PRINTTAB(2,22)"David M
cLachlan"
2600PROCdel(200):PROCgrid(
0):A%=FALSE:PROCshuffle:PRO
Cdel(100):PROCsolve(1):PROC
del(200)
2610CLS
2620PRINTTAB(1,1)"TO MOVE
BLOCKS USE":PRINTTAB(1,3)"T
HE FOLLOWING KEYS"
2630COLOUR 2:PRINTTAB(3,8)
"I.......Left"
2640PRINTTAB(3,11)"X......
.Right"
2650PRINTTAB(3,14)":......
.Up"
2660PRINTTAB(3,17)"/......
.Down"
2670PRINTTAB(3,20)"Space..
.Shuffle"
2680PRINTTAB(3,23)"Return.
.Reset"
2690COLOUR 1:PRINTTAB(2,28
)"Any key to start"
2700VDU21,19,2,2;0;
2710*FX138,0,130
2720END
2730DEFFNinst
2740VDU22,7:VDU23;8202;0;0
;0;
2750FORTX=2TO23:PRINTTAB(0
,TX)CHR$157CHR$132TAB(38)CH
R$156:NEXT
2760VDU28,2,23,37,2
2770CX=65
2780PRINTTAB(5,1)"R O Y A
L  W E D D I N G"
2800PRINT':RESTORE 3310
2810REPEAT
2820READA$:UNTILLENA$)5
2830REPEAT
2840PRINTTAB(4);CHR$(CX);C
HR$(VAL(RIGHT$(A$,3)))STRIN
G$(8,".")LEFT$(A$,LEN(A$)-3
)'
2850READA$
2860CX=CX+1
2870UNTILA$="E"
2880PRINTTAB(4)"Escape ...
To return to menu"
2890PRINT''TAB(3)CHR$129"P
lease select a letter"
2900*FX21
2910REPEAT
2920T%=GET AND &DF
2930UNTILT%)64 ANDT%(70
2935*FX178,0,0
2940="FNpic"+STR$(T%-64)
2950ENDPROC
2960DEFPROCdim
2970DIMc(24),s(24)
2980T%=0
2990FORT=0TO2*PI STEP2*PI/
24
3000c(T%)=COS(T):s(T%)=SIN
(T)
3010T%=T%+1:NEXT
3020ENDPROC
3030DEFPROCbig(A$,X%,Y%,cX
)
3040VDU31,X%,Y%
3050COLOURcX
3060LOCALaX,bX,dX,AX
3070FORaX=1TOLENA$
3080?DX=ASC(MID$(A$,aX,1))
3090SOUND1,2,?DX,1
3100X%=DXMOD256:Y%=DXDIV25
6:AX=&A:CALL&FFF1
3110FORbX=0TO1
3120VDU23,bX+130
3130FORcX=0TO3:FORdX=0TO1
3140VDUDX?(cX+bX*4+1)
3150NEXT:NEXT:NEXT
3160VDU130,10,8,131,11
3170NEXT
3180ENDPROC
3190DATA 0,0,330,855,340,8
55,365,980,390,855,490,855,
515,980,540,855,550,855,550
,820,540,820,540,770,490,77
0,440,885,390,770,340,770,3
40,820,540,820,330,820,330,
855,550,855,0,0,340,770,340
,630,390,630,390,770
3200DATA 0,0,390,630,490,6
30,490,770,0,0,490,630,540,
630,540,770,540,0,340,0,340
,630,340,680,480,680,0,0,48
0,680,540,680,0,0,340,580,5
40,580,0,0,340,475,540,475,
0,0,340,325,390,325,390,425
,440,455,490,425,490,325,54
```

To mark the happy occasion we've included this superb digitised picture of the Royal couple in our monthly tape. There's also a conversion program to allow it to be used in the sliding block puzzle.
Turn to Page 50.

```
0,325,390,325
 3210DATA 0,0,340,225,405,2
25,0,0,475,225,540,225,540,
210,490,210,440,250,390,210
,340,210,390,210,390,120,34
0,120,390,120,390,0,490,0,4
90,120,540,120,490,120,490,
210,0,0,540,520,760,520,752
,520,650,630,552,520
 3220DATA 0,0,650,600,632,5
80,632,540,672,540,672,580,
650,600,0,0,540,585,760,585
,0,0,540,480,760,480,0,0,54
0,230,565,230,565,390,565,2
30,737,230,737,390,737,230,
760,230,760,215,540,215,0,0
,540,340,565,340
 3230DATA 0,0,745,340,760,3
40,760,130,725,130,725,0,57
5,0,575,130,540,130,540,0,7
60,0
 3240DATA 440,855,0,125,0,-
10,10,0,0,-70,-10,0,10,0
 3250DATA8,4,345,900,1,40,1
0,1,0,65,1,-40,-15,0,4,770,
900,1,40,10,1,0,70,1,-40,-1
0,15,4,770,900,1,50,40,1,0,
70,1,-50,-40,15,4,350,900,1
,45,40,1,0,70,1,-45,-40,7,4
,390,934,5,390,938,4,810,93
4,5,810,938,1,4,1085,0,1,0,
40,4,1093,0,1,0,100
 3260DATA1,4,1130,0,1,0,70,
4,1100,0,1,0,250,1,1,25,0,1
,0,-250,1,-6,0,1,0,250
 3270DATA4,0,80,5,440,430,8
5,0,430,4,0,590,5,440,590,8
5,0,940,4,80,1023,5,560,640
,85,560,1023,4,720,1023,5,7
20,640,85,1200,1023,4,1279,
940,5,840,590,85,1279,590,4
,1279,430,5,840,430,85,1279
,80,4,1200,0,5,720,380,85,7
20,0,4,560,0,5,560,380
 3280DATA85,80,0,3,4,0,660,
5,290,660,85,0,900,4,180,10
23,5,520,750,85,520,1023,4,
790,1023,5,790,740,85,1140,
1023,4,1279,860,5,1000,640,
85,1279,640,4,1279,360,5,98
0,360,85,1279,120,4,1100,0,
5,760,260
 3290DATA85,760,0,4,490,0,5
,490,270,85,140,0,4,0,160,5
,280,380,85,0,380,0
 3300DATA6,134,16
 3310DATA Westminster Abbey
132,Royal couple132,Union J
ack132,Souvenir balloon132,
Load own picture132,E,1,4,6
,9
3320DEFPROCcode
3330scrnpoint=&80
3340varpoint=&70
3350FORT%=0TO2STEP2
3360P%=&110
3370M%=P%
3380[OPTT%
3381SEI
3390LDA&601:STAvarpoint
3400LDA&602:STAvarpoint+1
3410LDA&604:STAvarpoint+2
3420LDA&605:STAvarpoint+3
3430LDY#0
3440LDA(varpoint+2),Y:AND#
15
3450TAX
3460LDApointer1,X:STAscrnp
oint+2
3470LDApointerh,X:STAscrnp
oint+3
3480LDA(varpoint),Y:AND#15
3490STA(varpoint+2),Y
3500TAX
3510LDApointer1,X:STAscrnp
oint
3520LDApointerh,X:STAscrnp
oint+1
3530LDX#8
3540.loop1
3550LDY#160
3560.loop2
3570LDA(scrnpoint),Y
3580STA(scrnpoint+2),Y
3590LDA#0
3600STA(scrnpoint),Y
3610DEY:BNEloop2
3620DEX:BEQout
3630CLC:LDAscrnpoint
3640ADC#&80:STAscrnpoint
3650LDAscrnpoint+1
3660ADC#2:STAscrnpoint+1
3670CLC:LDAscrnpoint+2
3680ADC#&80:STAscrnpoint+2
3690LDAscrnpoint+3
3700ADC#2:STAscrnpoint+3
3710SEC:BCSloop1
3720.out CLI
3730RTS
3740.pointer1
3750]:P%=P%+16:[OPTT%
 3760.pointerh
 3770]:NEXT
 3780DX=&A00
 3790FORY%=0TO3
 3800FORX%=0TO3
 3810AX=&3000+X%+160+Y%+&14
00-1
 3820pointer1?(X%+Y%*4)=AX%M
OD256
 3830pointerh?(X%+Y%*4)=AXD
IV256
 3840NEXT
 3850NEXT
 3860ENVELOPE1,0,0,0,0,0,0,
0,126,-4,-3,-3,126,100
 3870ENVELOPE2,1,0,0,0,0,0,
0,63,43,0,-63,63,126
 3880VDU6,23,230,0,0,112,29
,7,1,1,0
 3890VDU23,231,0,0,14,184,2
24,128,128,0
 3900VDU23,232,1,3,0,0,0,0,
0,0
 3910VDU23,233,0,0,0,3,0,0,
0,0
 3920VDU23,234,128,192,0,0,
0,0,0,0
 3930VDU23,235,0,0,0,192,0,
0,0,0,21
 3940ENDPROC
 3950DEFPROCcode2
 3960 OSWORD=&FFF1
 3970 OSWRCH=&FFEE
 3980 FOR pass%=0 TO 2 STEP 2
 3990P%=&900
 4000 [
 4010 OPT pass%
 4020 .width NOP
 4030 .depth NOP
 4040 .xstep NOP
 4050 .ystep NOP
 4060 .xpos NOP:NOP
 4070 .ypos NOP:NOP
 4080 .xstore NOP:NOP
 4090 .ystore NOP:NOP
 4100 .pattern NOP
 4110 ]
 4120 $P%="12345678"
 4130 P%=P%+8
 4140  [ OPT pass%
 4150 .start LDX # pattern
MOD 256
 4160 LDY # pattern DIV 256
 4170 LDA # &0A
 4180 JSR OSWORD
 4190 LDA ypos
 4200 STA ystore
```

Royal Wedding listing

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```
4210 LDA ypos+1
4220 STA ystore+1
4230 LDY # 0
4240 .outer_loop LDA xpos
4250 STA xstore
4260 LDA xpos+1
4270 STA xstore+1
4280 LDA pattern+1,Y
4290 LDX # 0
4300 .inner_loop ASL A
4310 BCC noprint
4320 PHA
4330 TXA:PHA
4340 TYA:PHA
4350 JSR write
4360 PLA:TYA
4370 PLA:TXA
4380 PLA
4390 .noprint PHA
4400 CLC
4410 LDA xstore
4420 ADC xstep
4430 STA xstore
4440 LDA xstore+1
4450 ADC # 0
4460 STA xstore+1
4470 PLA
4480 INX
4490 CPX # 8
4500 BNE inner_loop
4510 SEC
4520 LDA ystore
4530 SBC ystep
4540 STA ystore
4550 LDA ystore+1
4560 SBC # 0
4570 STA ystore+1
4580 INY
4590 CPY # 8
4600 BNE outer_loop
4610 CLC
4620 LDA xstore
4630 ADC xstep
4640 STA xpos
4650 LDA xstore+1
4660 ADC #0
4670 STA xpos+1
4680 RTS
4690 .write LDA # 5
4700 JSR OSWRCH
4710 LDA # &19
4720 JSR OSWRCH
4730 LDA # 4
4740 JSR OSWRCH
4750 LDA xstore
4760 JSR OSWRCH
4770 LDA xstore+1
4780 JSR OSWRCH
4790 LDA ystore
4800 JSR OSWRCH
4810 LDA ystore+1
4820 JSR OSWRCH
4830 LDA # &E0
4840 JSR OSWRCH
4850 LDA #4
4860 JSR OSWRCH
4870 RTS
4880 .definer LDA # 23
4890 JSR OSWRCH
4900 LDA # &E0
4910 JSR OSWRCH
4920 LDA # 0
4930 LDX width
4940 .define_row SEC
4950 ROR A
4960 DEX
4970 BNE define_row
4980 LDY depth
4990 .send_rows JSR OSWRCH
5000 DEY
5010 BNE send_rows
5020 .send_blanks
5030 LDY # 0
5040 LDA # 0
5050 .blank JSR OSWRCH
5060 DEY
5070 BNE blank
5080 RTS
5090 ]
5100 NEXT pass%
5110ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

OSWORD

In the final part of this series JOHN WOOLLARD explains the five remaining Osword calls

THIS is our last venture into the world of Osword in this series. There are five calls left to be explained and first we'll take a look at those concerned with the internal elapsed time clock – Oswords 1 and 2 – and the interval timer – Osword 3 and 4.

The internal clock counts the time in hundredths of a second and it starts the very moment your micro is switched on. To discover its value simply enter:

```
PRINT TIME
```

The result, TIME, is a number between zero and several billion. We can use that value to set and then read the real time. To convert the numbers to hours, minutes and seconds requires these operations:

seconds = (TIME DIV 100) MOD 60
minutes = (TIME DIV 6000) MOD 60
hours = (TIME DIV 360000) MOD 24

Remember also that the clock ticks 100 times per second, so 100 is 1 second, 2 × 100 is 2 seconds ... 60 × 100 is 60 seconds or one minute and so on. Conversely to set the TIME – ignoring seconds – simply enter:

```
TIME=hours*360000+minutes*6
000
```

The interval timer is another clock similar to the internal clock and again it increments every hundredth of a second.

However it is different in that its value cannot be found using Basic instructions. We'll see shortly how Osword calls 3 and 4 are used to read and write its value.

Program I illustrates the basic principle of making Osword calls. They all require a parameter block so that data may be passed to or received from the routine summoned.

That block can be placed anywhere in the memory of the computer. Its address is placed in the X and Y registers before the call is made, X taking the lo-byte and Y the hi-byte.

Figure I shows the structure of the parameter block that passes the value of the internal clock TIME in Program I. It's located immediately after the code and is labelled *time*.

X is made equal to *time* MOD 256 – the lo-byte – and Y equal to *time* DIV 256 – the hi-byte. Running the program sets TIME to zero – it prints the value before and after the machine code call is made.

Let's see how the internal clock can be used. The maximum value that is of interest to most users is 24 hours which is 24*60*60*100 or 8640000. This can be stored in three bytes.

However Oswords read and write TIME as five bytes, so the top two bytes of the parameter block are unnecessary and are set to zero. The other three take on a value which is equivalent to 360000 × hours + 6000 × minutes + 100 × seconds.

Program I can easily be modified to set the internal clock to the current time. Here's an example that sets TIME to half past one in the afternoon (13:30:00) – 360000 × 13 + 6000 × 30, or 4680000. In hex that's &476940. Change lines 120 to 160 of Program I to:

```
160 EQUB &40
170 EQUB &69
180 EQUB &47
190 EQUB &0
200 EQUB &0
```

and run it again.

It should be noted that the parameter block contains the least significant number first – the highest two values in the

→

Block	Value
YX	Least significant byte of TIME.
YX+1	—
YX+2	—
YX+3	—
YX+4	Most significant byte of TIME.

Figure I: Parameter blocks for Osword calls 1 to 4

Block	Value
YX	Low byte of buffer address.
YX+1	High byte of buffer address.
YX+2	Maximum length of input line.
YX+3	Minimum acceptable Ascii value.
YX+4	Maximum acceptable Ascii value.

On exit C=0 if Return is pressed. C=1 if Escape is pressed.
Y=length of input string.
Control+U is used to delete the whole input – the Delete key only removes the last character entered.

Figure II: Parameter block for Osword call A=0

```
 10 REM PROGRAM I
 20 osword = &FFF1
 30 program = &900
 40 FOR opt=0 TO 2 STEP 2
 50 P% = program
 60 [OPT opt
 70 LDX# time MOD 256
 80 LDY# time DIV 256
 90 LDA# 2 : JSR osword
100 RTS
110 .time
120 EQUB 0
130 EQUB 0
140 EQUB 0
150 EQUB 0
160 EQUB 0
170 ]
180 NEXT
190 PRINT"TIME = ";TIME
200 CALL program
210 PRINT"TIME = ";TIME
```

Program I

```
 10 REM PROGRAM II
 20 osword = &FFF1
 30 program = &900
 40 FOR opt=0 TO 2 STEP 2
 50 P% = program
 60 [OPT opt
 70 LDX# time MOD 256
 80 LDY# time DIV 256
 90 LDA# 1 : JSR osword
100 RTS
110 .time
120 EQUB 0
130 EQUB 0
140 EQUB 0
150 EQUB 0
160 EQUB 0
170 ]
180 NEXT
190 CALL program
200 PRINT"TIME = ";!time
210 PRINT"!time = ";!time
```

Program II

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block being set to zero.

Program II uses Osword 1 to read the clock. The result is placed in the parameter block *time*. Line 200 prints the value of TIME and line 210 prints the contents of the block.

The reason they are sometimes different is that TIME may be incremented in the period between the computer processing line 190 then 200.

The internal clock is useful in programs if the real time needs to be displayed. By setting it at the start of the program the time can be printed out by converting the value of TIME to seconds, minutes and hours.

We'll now consider that other clock, the interval timer. In many ways this is a much more powerful tool than TIME, but unfortunately its value cannot be read or written directly from Basic.

Program III shows how the timer is read using Osword with A=3. Like the programs for reading and writing the value of TIME the parameter block contains five bytes of data.

The usefulness of the interval timer is that it can generate interrupts. If you're not sure what interrupts are then have a look at the last in the Osbyte series in the February 1986 issue of *Electron User*.

Briefly, your micro has been designed so that certain events or happenings are immediately and automatically communicated to the central processor. The computer can be made to act in a specific way on receiving a particular signal.

One of those events occurs when the interval timer crosses zero. It's like a 24 hour clock at 0:00:00 midnight going right round and back to 0:00:00 at midnight the next day.

There are four steps we have to take to make this a useful technique.

- Set up a machine code routine that you wish to occur at a predetermined time when the event occurs.
- Place the address of the start of the machine code routine in locations &220 and &221, lo then hi byte.
- Activate the interrupt using the Osbyte call A=14, X=5 and Y=0 or use *FX14,5 in

```
 10 REM PROGRAM III
 20 osword = &FFF1
 30 program = &900
 40 FOR opt=0 TO 2 STEP 2
 50 P% = program
 60 [OPT opt
 70 LDX# time MOD 256
 80 LDY# time DIV 256
 90 LDA# 3 : JSR osword
100 RTS
110 .time
120 EQUB 0
130 EQUB 0
140 EQUB 0
150 EQUB 0
160 EQUB 0
170 ]
180 NEXT
190 CLS:VDU23,1,0;0;0;0;
200 CALL program
210 PRINT TAB(5,10)"Inter
val Timer=";!time
220 GOTO200
```

Program III

```
 10 REM PROGRAM IV
 20 osword = &FFF1
 30 program = &900
 40 FOR opt=0 TO 2 STEP 2
 50 P% = program
 60 [OPT opt
 70 .interrupt
 80 PHA:TXA:PHA:TYA:PHA
 90 LDX# sound MOD 256
100 LDY# sound DIV 256
110 LDA# 7 : JSR osword
120 PLA:TAY:PLA:TAX:PLA
130 RTS
140 .sound
150 EQUW 1
160 EQUW -15
170 EQUW 100
180 EQUW 30
190 .setup
200 LDX# time MOD 256
210 LDY# time DIV 256
220 LDA# 4 : JSR osword
230 RTS
240 .time
250 EQUB &48
260 EQUB &F4
270 EQUB &FF
280 EQUB &FF
290 EQUB &FF
300 ]
310 NEXT
320 REM set up interrupt
pointer
330 ?&220 = interrupt MOD
256
340 ?&221 = interrupt DIV
256
350 REM set interval time
r to -30 seconds
360 CALL setup
370 REM enable interval t
imer interrupt event
380 *FX 14,5
```

Program IV

```
 10 REM PROGRAM V
 20 osword = &FFF1
 30 osbyte = &FFF4
 40 program = &900
 50 FOR opt=0 TO 2 STEP 2
 60 P% = program
 70 [OPT opt
 80 LDA#interrupt MOD 256
: STA &220
 90 LDA#interrupt DIV 256
: STA &221
100 LDA# 14 : LDX# 5 : LD
Y# 0 : JSR osbyte  \*FX14,5
110 .interrupt
120 PHA:TXA:PHA:TYA:PHA
130 LDX# sound MOD 256
140 LDY# sound DIV 256
150 LDA# 7 : JSR osword
160 \SOUND 1,-15,255,1
170 LDX# time MOD 256
180 LDY# time DIV 256
190 LDA# 4 : JSR osword
200 \ forces the interval
timer to -1 second
210 PLA:TAY:PLA:TAX:PLA
220 RTS
230 .sound
240 EQUW 1
250 EQUW -15
260 EQUW 100
270 EQUW 1
280 .time
290 EQUB &9C
300 EQUB &FF
310 EQUB &FF
320 EQUB &FF
330 EQUB &FF
340 ]
350 NEXT
360 CALL program
```

Program V

```
 10 REM PROGRAM VI
 20 osbyte = &FFF4
 30 osword = &FFF1
 40 oswrch = &FFEE
 50 DIM program &140
 60 FOR opt=0 TO 2 STEP 2
 70 P% = program
 80 [OPT opt
 90 .inputbuffer
100 EQUS STRING$(255,CHR$
13)
110 .block
120 EQUB inputbuffer MOD
256
130 EQUB inputbuffer DIV
256
140 EQUB 255
150 EQUB 0
160 EQUB 255
170 .input
180 LDX# block MOD 256
190 LDY# block DIV 256
200 LDA# 0 : JSR osword
210 BCS escape
220 RTS
230 .escape
240 LDA# 126 : LDX# 0 : L
DY# 0
250 JSR osbyte
260 RTS
270 ]
280 NEXT
290 CALL input
300 PRINT $inputbuffer
310 PRINT $&600
```

Program VI

Basic. To disable the interrupt we use *FX13,5.

● Set the interval timer so that it reaches zero in the required number of seconds, minutes or hours.

Program IV illustrates these steps – it produces a sound after 30 seconds. The part of the program that is called when the interrupt occurs starts on line 70. It uses another Osword call with A=7 to generate a sound, and its parameter block contains the eight bytes of data required.

The address of the interrupt routine is placed in locations &220 and &221 and the interrupt is activated using *FX14,5. A short machine code routine is used to set the interval timer to minus 30 seconds, which is a bit like setting a 24 hour clock to 30 seconds to midnight, 11:59:30.

This means that the beep will occur exactly 30 seconds after the program has been run when the timer crosses zero, no matter what the computer is doing – this is the power and value of interrupts.

Program V uses the same interrupt technique to make the computer tick every second. To stop the ticking disable the interrupt using *FX13,5. To calculate the value to set the interval timer:

```
PRINT"&FF";~-(hours*360000+
minutes*6000+seconds*100)
```

'. . . this is the power and value of interrupts'

and place the bytes in reverse order in the parameter block.

The final Osword call with A=0 is used by machine code programmers to input a string from the keyboard. It's the equivalent of Basic's INPUT. Figure II shows the structure of the parameter block.

The parameter block determines the maximum length of the string, the range of characters that are acceptable and the address where the operating system is to store it.

Program VI contains an input routine that can be used in any machine code program. Line 100 reserves 255 bytes of memory for the string and lines 120 to 160 set up the Osword parameter block. Figure II outlines its structure.

After the Osword call has been made the routine checks to see if the Carry flag is set in line 210. This is the operating system's way of telling us that Escape was pressed. If it is set then Escape must be acknowledged with Osbyte 126.

In Program VI the string is stored in *inputbuffer* situated at the start of the machine code program. However the computer has its own buffer for inputting strings. It's located in page 6 of the memory, from &600 to &6FF.

Lines 300 and 310 of the program print out the contents of that buffer as well as the buffer specified by our program. You can see that they're the same.

You'll actually see three strings – the one you type in, the one the operating system stores at &600 and the one stored by Program VI.

Program VII shows how the inputted characters can be restricted by changing the values in the parameter block.

Only lower case letters are entered into our buffer, but notice that all characters typed are printed on the screen. Try it and you'll see what I mean.

In the parameter block location XY+3 is set to 97 (Ascii a) and XY+4 is 122 (Ascii z). In addition only five characters can be entered – XY+2 equals 5.

Program VIII shows another use of the input routine. It inputs a string and displays it backwards.

The routine uses the fact that after the input call has been made the Y register contains the value of the length of the string.

After the string has been input a loop is used to print out the string in reverse. Oswrch is used to send the character to the screen.

● *That's the end of this series on Osword calls. I hope you find them useful in your endeavours. Good luck with your programming.*

```
  10 REM PROGRAM VII
  20 osbyte = &FFF4
  30 osword = &FFF1
  40 oswrch = &FFEE
  50 DIM program &140
  60 FOR opt=0 TO 2 STEP 2
  70 P% = program
  80 [OPT opt
  90 .inputbuffer
 100 EQUS STRING$(255,CHR$
13)
 110 .block
 120 EQUB inputbuffer MOD
256
 130 EQUB inputbuffer DIV
256
 140 EQUB 5
 150 EQUB 97
 160 EQUB 122
 170 .input
 180 LDX# block MOD 256
 190 LDY# block DIV 256
 200 LDA# 0 : JSR osword
 210 BCS escape
 220 RTS
 230 .escape
 240 LDA# 126 : LDX# 0 : L
DY# 0
 250 JSR osbyte
 260 RTS
 270 ]
 280 NEXT
 290 CALL input
 300 PRINT $inputbuffer
```

Program VII

```
  10 REM Program VIII
  20 osbyte = &FFF4
  30 osword = &FFF1
  40 oswrch = &FFEE
  50 DIM program &140
  60 FOR opt=0 TO 2 STEP 2
  70 P% = program
  80 [OPT opt
  90 .inputbuffer
 100 EQUS STRING$(255,CHR$
13)
 110 .block
 120 EQUB inputbuffer MOD
256
 130 EQUB inputbuffer DIV
256
 140 EQUB 255
 150 EQUB 32
 160 EQUB 127
 170 .input
 180 LDX# block MOD 256
 190 LDY# block DIV 256
 200 LDA# 0 : JSR osword
 210 BCS escape
 220 RTS
 230 .escape
 240 LDA# 126 : LDX# 0 : L
DY# 0
 250 JSR osbyte
 260 RTS
 270 \input string
 280 \and reverse it
 290 .reverse
 300 JSR input
 310 .loop
 320 LDA inputbuffer,Y
 330 JSR oswrch
 340 CPY# 0 : BEQ rts
 350 DEY
 360 JMP loop
 370 .rts
 380 LDA# 10 : JSR oswrch
 390 LDA# 13 : JSR oswrch
 400 RTS
 410 ]
 420 NEXT
 430 CALL reverse
```

Program VIII

Subroutines for simpler programs and less typing

By PETE BIBBY

THIS month we'll be leaving behind the functions we got entangled with last time and moving on to a whole new way of programming.

But first let's look at an old, horrible way of programming, in the form of Program I.

```
  10 REM Program 1
  20 PRINT "Enter monthly
income"
  30 INPUT monthly
  40 IF monthly<200 THEN G
OTO 100 ELSE GOTO 200
  100 REM below tax thresho
ld
  110 PRINT "Net pay is "jm
onthly" tax paid is 0"
  120 GOTO 300
  200 REM tax routine
  210 tax=monthly*0.1
  220 net=monthly-tax
  230 PRINT "Net pay is "jn
et" tax paid is "tax
  240 GOTO 300
  300 END
```

Program I

By now you should be well aware of my prejudice against GOTOs. They should be avoided at all costs.

Still, in Program I they're not too bad: It's fairly easy to see what's happening. Which, to be honest, is very little!

All the program does is to ask you how much you earn per month and store it in the variable *monthly*. Line 40 then tests *monthly* to see if it is less than 200 (in which case no tax has to be paid).

If this is so, the program jumps to line 100. Otherwise it goes to line 200.

Suppose that *monthly* had the value 100. In this case it's true that *monthly* is less than 200, so the program immediately moves to line 100.

This is just a REM hinting at what the next few lines are going to do. In fact, they don't do much. Line 110 just tells you your net pay and the fact that you pay no tax.

The next line is more interesting. Its GOTO has the program going to line 300 which is the END that ends the program.

Now if *monthly* was 200 or over, say 300, then the test of line 40 would fail and the part after the ELSE would be performed.

This sends the program to line 200 which is the start of a section of code that works out the tax paid and the net pay.

There's nothing difficult in either the coding or the maths, although the tax rate is sadly far from realistic.

At the end of that line 240 tells the program to GOTO line 300, the end again.

This last GOTO isn't really necessary, as the program would have come to line 300 anyway. However it's good practice to put it in, to keep things tidy and allow easier modification of the program at a later date.

It helps to have all the loose ends of a program gathered up at a single END.

Notice the way that the IF of line 40 chooses between two sections of code.

Also see how the two bits of code are completely separate. I've highlighted this by using line numbers starting at 100 and 200 for each section.

When the program is run, only one of these bits of code is performed, the GOTOs being used to leap over the unused lines. Figure I shows the program's flow of control diagramatically.

This idea of having separate sections of a program doing separate things is extremely important, as you'll find when you come to write more complicated, practical programs of your own.

As we'll see, they make it much easier to write, correct and alter programs. And to be fairly confident that they will work.

The trouble is the GOTOs are messy and in a long program they get messier.

What we need are subroutines. Program II has an example of one of these in use.

Looking at lines 10 to 60 the program seems fairly

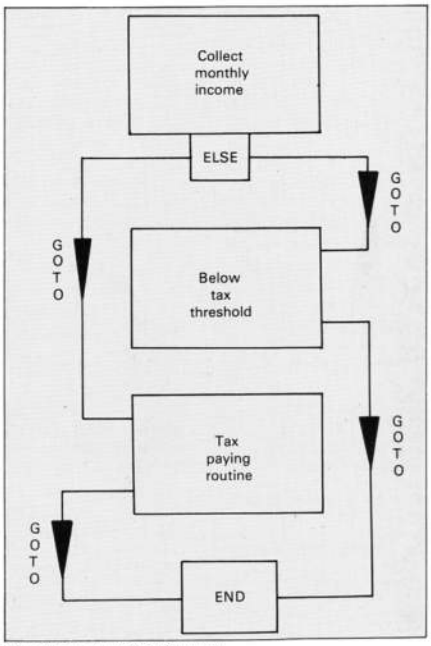

Figure I: Flow of control for Program I

```
  10 REM Program II
  20 PRINT "Give me a numb
er"
  30 INPUT number
  40 GOSUB 100
  50 PRINT "The square of
 ";number" is ";square
  60 END
 100 REM squaring routine
 110 square=number*number
 120 RETURN
```

Program II

straightforward. It takes a number from the keyboard and stores it in *number*.

Line 50 obviously prints out the value of *number* squared, and line 60 brings things to a halt. But what is this GOSUB 100 in line 40?

GOSUB tells the micro that it is to go to a section of code beginning at the line specified (in this case 100) and perform that. This code is known as a subroutine.

In this case the Electron obeys line 40 and goes to the subroutine starting at line 100. This is just a REM labelling the subroutine.

Take my advice, and always use a REM or two to explain what the subroutine does – or what you hope it does! It saves a lot of time, trouble and torment when you come to correcting or debugging faulty programs.

Once the program has entered the subroutine at line 100 it carries on as normal, going from line to line.

In this case it ignores the REM and goes on to calculate the square of *number*, storing it in *square*.

The next line contains another new keyword, RETURN. This does two things. First of all it marks the end of the subroutine (notice that there's nothing to show the start of a subroutine, hence the use of a REM).

It does more than that however: It also tells the micro to go back to the line that follows the one that called the subroutine, that is, the line after the original GOSUB.

In this case it was line 40 that sent the program hurtling off to the subroutine starting at line 100, so the RETURN of line 120 sends the program back to line 50.

The micro then carries on as normal, going from line to line.

Line 50 just displays the value of *square* and the next line, 60, ends the program.

If you like, you can look on the subroutine as a little program in its own right.

In Program II we only had one simple assignment statement before the micro came across the RETURN that ended the subroutine.

In fact you can have all the normal Basic commands in a subroutine. So you can have loops, IF statements and even subroutines.

More of this later on. The point to grasp is that GOSUB allows us to use a section of code without all the messiness we'd meet if we tried doing it with GOTOs.

A closer look at Program II produces a bit of a puzzle. After all, the END of line 60 brings things to a halt. So how does the program get to use lines 100 to 120 which come after the END?

The answer lies in the fact that the GOSUB that accesses the routine comes before the END. As this sends the program off to the code beginning at line 100, the END is jumped over.

It's rather like the way the GOTOs leapt over code in Program I. At the end of the subroutine, the program goes back to line 50 and then meets the END of line 60.

And this END has to be there. Try leaving it out and see what happens.

You get:

```
No GOSUB at line 120
```

What has happened is that the program has performed as before, calling the subroutine and then RETURNing to the line after it and carrying on from there.

Only now the END is missing. The program carries on undaunted and gets on with executing lines 100 and 110. So far so good.

But what does the poor Electron do with the RETURN of line 120?

Normally when it meets a GOSUB the micro keeps a note of the following line number so it knows where to go back to when it meets RETURN. The GOSUBs and RETURNS are neatly paired.

Except, that is, at line 120 where the program now comes across a RETURN without having a matching GOSUB, and hence no place to return to.

The result is the computer gives up and an error message is issued.

So the rule is tuck your subroutines away after an END. You can look on these subroutines at the end of the program as similar to the appendices of a book. When the program comes across a GOSUB it refers to these subroutines to find out what to do. After this brief diversion it carries on with the main program. Figure II shows the flow of control in Program II.

Program III is a version of Program I. This time it uses the much superior subroutines rather than the horrible GOTOs.

The first three lines do the same job as before, but line 40 has changed. It now chooses between two subroutines, rather than two sections of code insulated from each other by a series of GOTO-inspired jumps.

The code in these two subroutines is just the same as before, except that now they are tucked away after the END

→

```
  10 REM Program III
  20 PRINT "Enter monthly
income"
  30 INPUT monthly
  40 IF monthly<200 THEN G
OSUB 100 ELSE GOSUB 200
  50 END
 100 REM below tax thresho
ld
 110 PRINT "Net pay is "; m
onthly" tax paid is 0"
 120 RETURN
 200 REM tax routine
 210 tax=monthly*0.1
 220 net=monthly-tax
 230 PRINT "Net pay is ";n
et" tax paid is "tax
 240 RETURN
```

Program III

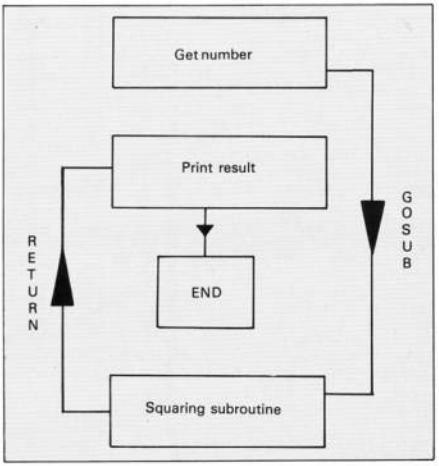

Figure II: Flow of control for Program II

From Page 45

of line 50 and they are both terminated with RETURN.

In this case it makes little or no difference whether we use subroutines or not. The code is practically the same, although I think you'll agree that once you know about subroutines, Program III is easier to follow.

So subroutines make programs simpler. They can also save a lot of typing.

Very often programs use the same bits of code over and over again with only minor differences. A games program might calculate the score after every screen, the only difference in the sums being the actual bonus per screen held in, say, the numeric variable *bonus*.

It's much easier to have just one scoring subroutine and call it with the appropriate value of *bonus*, rather than copy out all the lines of the scoring routine each time you want to use it.

And subroutines not only simplify programs and save typing time, they also make it much easier to alter them.

Suppose that the tax laws suddenly changed, and instead of being taxed at 10 per cent it becomes 20 per cent.

In Program I we have to search through the listing, find the appropriate line and change it. In Program III we can go straight to the "tax routine" subroutine and modify that in the light of the new rate.

In fact, we could change all the code in that subroutine, adding new lines and the program would still work. We could "plug in" an entirley new routine as needed without having to worry about the rest of the program.

In the longer, more practical programs that you'll soon be writing, this ability to modify programs by changing the subroutines makes life a lot easier. But before you start creating an epic listing have a look at Program IV.

It consists of just two subroutines. The first, lines 100 to 130, simply asks for the user's age and stores it in *age*. The second, lines 200 to 260, prints out an appropriate message if the right age is entered.

```
  10 REM Program IV
  20 GOSUB 100:REM get the
 age
  30 GOSUB 200:REM give th
e message
  40 END
 100 REM collects age
 110 PRINT "How old are yo
u"
 120 INPUT age
 130 RETURN
 200 REM displays message
 210 IF age<0 THEN PRINT "
Liar"
 220 IF age>0 AND age<5 TH
EN PRINT "You learnt to rea
d early"
 230 IF age<18 THEN PRINT
"You can't vote"
 240 IF age=21 THEN PRINT
"Ever been kissed?"
 250 IF age=40 THEN PRINT
"Your life is beginning aga
in"
 260 RETURN
```

Program IV

Notice how the subroutines begin with an explanatory REM and each start on a line number which is a multiple of 100, making them easy to find.

The program itself is desperately simple, but it does show a couple of things. Look how short the main program is. It's only four lines long and one of those is a REM and another the END!

Really, only two lines are doing the work, the two that call the subroutines. Yet in those two lines the whole structure of the program is shown clearly. Of course, the REMs help. (Moral: if in doubt, stick a REM there.)

I said earlier that subroutines could be looked on as mini-programs. They can have IF statements and loops and all the normal structures. They can even call subroutines as Program V, which does the same job as Program IV, demonstrates.

The big change comes in the subroutine formed by lines 200 to 260. Here, instead of a simple PRINT after the IF, another subroutine is called.

These new subroutines are listed from lines 300 to 710. I haven't put in the normal opening REMs as I think the PRINT statements document them fully.

Of course it's a trivial example but suppose that these sub-subroutines were more useful than just a silly message.

They might, in fact, be routines to work out age-related benefits. So if you are between 0 and 5 years of age, the subroutine at 400 might contain all sorts of child welfare information and calculations. It might even call other subroutines.

But more of that next month. For the moment just grasp that like big fleas have little fleas, so subroutines can call subroutines.

But before you get the itch to write a few subroutines yourself have a look at Program VI.

```
  10 REM Program V
  20 GOSUB 100
  30 GOSUB 200
  40 END
 100 REM collects age
 110 PRINT "How old are yo
u";
 120 INPUT age
 130 RETURN
 200 REM displays message
 210 IF age<0 THEN GOSUB 3
00
 220 IF age>0 AND age<5 TH
EN GOSUB 400
 230 IF age<18 THEN GOSUB
500
 240 IF age=21 THEN GOSUB
600
 250 IF age=40 THEN PRINT
"Your life is beginning aga
in"
 260 RETURN
 300 PRINT "Liar"
 310 RETURN
 400 PRINT "You learnt to
read early"
 410 RETURN
 500 PRINT "You can't vote
"
 510 RETURN
 600 PRINT "Ever been kiss
ed?"
 610 RETURN
 700 PRINT "Your life is b
eginning again"
 710 RETURN
```

Program V

```
  10 REM Program VI
  20 firstRoutine=100
  30 secondRoutine=200
  40 GOSUB firstRoutine
  50 GOSUB secondRoutine
  60 END
 100 REM first routine
 110 PRINT "first routine"
 120 RETURN
 200 REM second routine
 210 PRINT"second routine"
 220 RETURN
```

Program VI

While it hardly pushes back the frontiers of Electron programming, it does show one important technique.

Notice how the GOSUBs of lines 40 and 50 are followed by variable names instead of the usual numbers.

The line numbers have been stored in *firstRoutine* and *secondRoutine* in lines 20 and 30. This makes the program much clearer to read and understand. Programs with lines like:

```
100 GOSUB calculateTax
```

or:

```
200 GOSUB zapAlien
```

are almost self-documenting.

Unfortunately though, the RENUMBER command doesn't take them into account so they aren't too practical.

● *On which note we'll finish for this month. Next time we'll have a look at subroutines in greater detail and see how they can help us plan our programs.*

Micro Messages

Viewstore for those really big databases

I HAVE a Cumana disc system and wanted to use the spare ROM socket for a good disc-based database.

After much difficulty in getting answers as far as compatibility is concerned I decided to risk buying Viewstore in the hope that it would work.

It did so perfectly. It is rather slow, as is a lot of BBC software run on the Electron, but it allows Electron users to handle extremely large databases.

It passes information to View (ROM cartridge) for mail merging perfectly. Among other things I now use Viewstore for cataloguing my collections of books, cassettes and records.

As you know the Electron does not have the same function keys as the BBC Micro. After trial and error I discovered that the Electron's commands were as below:

Key	Function
1	Record Format
2	Change Display
3	Delete End of Record
4	Beginning of Field
5	End of Field
6	Index Field
7	Locate
8	Insert Character
9	Delete Character
0	Data
A	Card Layout
B	Database Header
C	Cursor Lock
J	Delete Record
M	Beginning of Record
N	End of Record
O	Down one Screen
P	Up one Screen
.	End of File
/	Beginning of File
-	Forward one Character
,	Back one Character

Because the Cumana disc system should not get 'Can't Extend' errors it is not necessary to state the space required on the disc when setting up a database.

I see no reason why Viewstore should not work for Plus 3 users as well, providing they have something like a ROM adapter for a Plus 1 Cartridge or a Slogger ROM Box.

Finally could you tell me if the Slogger Turbo-driver might speed up Viewstore by making disc accessing faster?

Would this make my Electron any more unreliable? It tends to crash occasionally for no apparent reason – I put this down to its heavy work load. – **Stephen W. Domleo, Umberleigh, N. Devon.**

● The Turbo-driver will speed up your Electron, but the disc system will be pretty much the same.

If you use Modes 0 to 3 you'll find that screen operations and calculations are much faster.

We haven't had any reports of unreliable Turbo Electrons so it's probably safe to assume that it can cope with the extra speed.

Map of the Citadel

I BOUGHT Citadel for my Electron a month ago and I haven't yet finished it.

It would be a great help if you could print a plan of all the rooms and places in your mag. – **Michael Hughes, Gresford, Clwyd.**

● Can anyone help Michael with a map for Citadel?

More tips

I WOULD like to add to Tim Walter's tips on Citadel. Firstly he mentioned that to get the crystal in the central tower you must jump from the top of the East tower to pull the lever and hence lose a lot of energy.

This is not so. To pull the lever collect the bucket and fill it with water from the cellar.

Take the bucket with the water in to the East fireplace and put the fire out. Then climb up the chimney and you will be able to get to the lever.

Tim did not mention where to put the crystals. Take them to the temple and drop them where the trampoline is. The crystal will disappear and be placed in the sanctuary.

When you have all five crystals in the sanctuary stand on one of the pads in the room to the right of the sanctuary. You will be transported to the palace.

Here you must collect the bejewelled figurine and return to the temple the same way as you came.

You will then have destroyed the teleport system, and if you have 99 points you become ruler of Citadel.

To get 99 points you need the three crowns which are in the following three places:

● *Down the bottom of the well – drop the ice crystal at the bottom of the well so you can enter the room to your right where there is a crown.*

● *In the witch's house – when you get into the witch's house through the chimney and have killed the monk jump into the wall above the ladder.*

There you will find a secret passage leading to a room with a crown in it.

● *In the cellar – drop the trampoline or barrel where the key is. You will then be able to jump into a secret passage in the roof and walk into a room containing the last crown.*

One final point – people may be having trouble with lack of energy.

To help overcome this it is useful to take the blue blocks to Stonehenge, where they will be transformed into 30 or 40 energy units. – **D. Waterhouse, Hinckley, Leicester.**

. . . and more

THE Key to the Citadel letter in the May 1986 issue of Electron User *misinforms people of the correct way to get the fourth crystal.*

To put the switch on at the blue wall all that is needed is the green bucket filled with water off the beach to put the flames out at the east fireplace.

Once out there is a passage up the back of the fireplace up to the blue wall at the top.

To get past the monk go part way down the passage and he will stick in the hole and can be easily shot with a spell. – **Paul S. Leech, Seascale, Cumbria.**

ALL programs printed in this issue are exact reproductions of listings taken from running programs which have been thoroughly tested.

However, on the very rare occasions that mistakes may occur corrections will be published as a matter of urgency. Should you encounter error messages when you type in a program they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

Those trying programs . . .

I ENJOY reading Merlin's Cave and Micro Messages. I also like previews for games and advertisements.

My only problem is that whenever I try a program from the magazine they do not work! – **Brian Marum, Ealing.**

● Typing in listings from the magazine might seem easy, but getting them to run afterwards can be much more difficult.

When you have finished entering a program go through it very carefully, line by line, looking for simple typing errors.

Even experts can't type in a listing without making at least one error and usually there are several.

Rest assured that all our listings have been thoroughly checked and if any errors do slip through – a rare occurrence – you'll find the corrections in Micro Messages. Our eagle-eyed readers don't miss much!

Reader's choice

THANKS for a great magazine. I especially like Merlin's Cave and the new graphics series by Trevor Roberts – this really shows what can be achieved on an Electron.

How's about seeing a few software specials on games with a particular theme, such as unarmed combat, aircraft, football and so on?

I would also like to see the return of the Top Ten, as this gives a good idea of which games to buy and which ones to avoid. – **Munro Drive, Edinburgh.**

Tricky problem

IF anybody were to write to Acorn saying that they were thinking of buying a computer and could they have details of the Electron that information would be despatched by return of post free of charge.

However having sold the Electron Acorn no longer want to know you. In my opinion they act disgracefully toward Electron owners.

Last March I wrote to Acorn Technical Enquiries Dept. at Cambridge, enclosing a first class SAE. My letter of inquiry has been completely ignored.

As a pensioner I can ill-afford to waste postage stamps and envelopes. Could it be that Acorn are in such dire straits that they resort to steaming off postage stamps to reuse themselves?

If you publish this letter it may at least shame them into refunding the 34p I have wasted.

In view of the fierce competition in the computer industry it is strange that firms can be so indifferent and dilatory.

My simple inquiry to Acorn was requesting a foolproof method of preventing program listing. In June 1985 Electron User *you published a method in response to a reader's request, but I found I could break it.*

However there must be a system, as proved by Mini Office and other commercial tapes. – **J. Rayner, Mansfield, Notts.**

● You may have made a simple request but the solution is far from simple.

Simple protection systems are simple to break into – you'll find such a system in Micro Messages in our June 1986 issue.

Software companies employ protection experts – programmers who specialise in protection systems.

These programmers can provide you with a system that will foil 99.99 per cent of all pirates and hackers, but they aren't cheap and will provide you with a hefty bill.

WHAT would you like to see in future issues of Electron User?

What tips have you picked up that could help other readers?

Here is your opportunity to share your experiences.

Remember that these are the pages that you write yourselves. So tear yourself away from your Electron keyboard and drop us a line. And please, if you want a reply, enclose an SAE. The address is:

Micro Messages
Electron User
Europa House
68 Chester Road
Hazel Grove
Stockport SK7 5NY.

Lost for words

I HAVE just bought Commando by Elite for my Electron. It's not a bad game but why is it so slow?

In the April edition of Electron User *you said that Superior Software were producing Speech! for the Electron.*

A friend immediately placed an advanced order for Speech!, but in the May edition you said that they were not bringing it out. Which statement is true? – **Darren Wray, Ryde, Isle of Wight.**

● The Electron version of Commando is quite slow at times. Owners of Slogger's Turbo Driver will find it a fast and exciting game to play.

Superior Software at first thought that it may be possible to convert Speech to the Electron, but had to abandon it as they found it impossible.

Teletext adapter

IN your October 1984 issue it was mentioned that Sir Computers of Cardiff had brought out a Mode 7 adapter for the Electron.

However on inquiring at a local computer shop I was told that they had gone bust.

In the May 1986 issue you said that Morley Electronics have brought out a teletext adapter for use with the Electron with built in Mode 7.

Are there any other firms which produce a Mode 7 adapter? If not, are there likely to be any companies doing so in the near future? – **Chris Willis, Choppington, Northumberland.**

● The Morley teletext adapter is the only one available for the Electron, and we haven't heard of any other companies planning to produce one.

Circle of triangles

I FOUND Trevor Robert's Circle of Triangles program in the March 1986 Notebook interesting but not very efficient.

After all, when you've added the extra lines to make it loop five times the program calculates the x and y coordinates for every loop.

Why not, I asked myself, just calculate all the values of x and y once and for all, storing them in an array? Then the program can just reference these values from the loop instead of having to calculate them anew each time round. The result is the enclosed program:

```
  10 REM CIRCLE OF TRIANGL
ES
  20 REM TREVOR ROBERTS
  30 MODE 0
  40 DIM X(24),Y(24)
  50 VDU 29,640;512;
  60 GCOL 3,3
  70 degree=0
  80 FOR loop=1 TO 24
  90 angle=RAD(degree)
 100 X(loop)=200*SIN(angle
)
 110 Y(loop)=200*COS(angle
)
 120 degree=degree+15
 130 NEXT loop
 140 FOR outer=1 TO 5
 150 FOR inner=1 TO 24
 160 x=X(inner):y=Y(inner)
 170 PROCtriangle(x,y)
 180 NEXT inner
 190 NEXT outer
 200 END
 210 DEF PROCtriangle(x,y)
 220 MOVE x,y
 230 PLOT 1, 50,50
 240 PLOT 1,50,-50
 250 PLOT 1,-100,0
 260 ENDPROC
```

It is much faster than the earlier one. – **Guy Wicker, Sheffield.**

● Trevor says that you're right,

the program is a lot better your way.

He points out in mitigation that he only had a limited amount of space to explain the original listing without going into arrays.

Screen dump

DO you know of a suitable screen dump for the Epson MX-80 dot matrix printer as the one in the March 1985 issue doesn't work with my printer. – **Stuart Toller, Thornbury, Bristol.**

● You must have made a typing error. Actually you'll find an excellent dump suitable for Shinwa and Epson printers in the June 1986 issue of *Electron User*.

Listing Sphinx

HERE is a method for listing Sphinx Adventure by Paul Fellows without the need for a bad program fixer:

CHAIN Sphinx as usual. When it has loaded crash the program by typing GO RENUMBER RENUMBER RENUMBER ...., by holding down the Function key and B until you hear the string-too-long beep.

Press Return and then enter:

```
!TOP=&FF0D
```

Finally LIST as usual. – **David Patrick, Neilston, Glasgow.**

Electron's OS

WHAT OS has the present Electron got? If it is 1.2 is it possible to upgrade from OS 1.0 to OS 1.2?

I got my computer about 19 months ago and I have an OS of 1.0. – **E.A. Pearson, Ipswich, Suffolk.**

● There is only one version of the Electron's operating system – 1.0. This is equivalent to the BBC Micro's OS 1.2.

Keeping track of memory

CAN you help me with a few minor problems on my Electron?

Firstly I bought Mini Office which I find invaluable. However I have a problem with the spreadsheet program.

If I type in a lot of figures and formulae I occasionally get an error message saying 'no room at . . .' at which point the program breaks and I cannot retrieve the inputted data.

Is there any way of avoiding this by finding out how much memory is left, or by retrieving the information?

Secondly since I have got a Plus 1 interface I sometimes get the error message 'EVALEND' displayed when loading recorded tapes. What does it mean and what is its effect on the computer?

I cannot find any reference to it in my manual or in the booklet supplied with the Plus 1.

Thirdly I have bought a Brother HR-5 thermal transfer printer and the problem is getting the in-built functions to work.

In the manual the instructions say LPRINT or PRINT 1 but these do not work on my Electron and error messages are displayed.

Also is there a screen dump program for this printer, or does the Epson screen dump work on it?

Finally I am stuck on Sphinx. I can get as far as the serpent but, despite trying to set fire to something I still cannot get out. What is it I set fire to, and what command do I use?

The only way I have found of getting out is to rub the ring but that only lands back in the sorcerer's lair. – **David J. Meleleu, Wellingborough, Northants.**

● Unfortunately there's no indication of the amount of memory left, so stick to small numbers of figures and simple formulae.

If memory is a problem then you need a ROM-based spreadsheet, such as Viewsheet from Acornsoft. This will set you back about £25.

We've never had the error message you describe so we're stumped. Can anyone help?

Have a look at Micro Messages, May 1986 for help with your printer.

The January 1986 issue of *Electron User* contained a special on Sphinx with a complete solution.

Disc filing system

MY son and I decided to get a disc filing system for our Electron and we opted for Solidisk's EFS interface and a disc drive with PSU.

However three interfaces later, we are back to square one. Each arrived without a protective cover and was unworkable.

We have had no better luck with the disc drive. We sent off to Viglen for one with PSU, but were told that there had been an error in the advert and the price was in fact higher than stated.

We then decided to order one we could afford from Watford Electronics, but again we found the price had risen.

Surely these companies should have more reliable marketing strategies. They seem to advertise goods which they don't have in stock and for which they can't guarantee a price.

Can you recommend a reliable company which will provide a workable system at an acceptable price. We are not interested in the Plus 3 or the Cumana. – **C. Wood, Howden, Livingston.**

● If you've tried the Solidisk interface and you're not interested in the Plus 3 or Cumana interface, that only leaves Advanced Computer Products Plus 4 disc interface. This was reviewed in the June 1986 issue of *Electron User*.

It is an excellent interface and is the one we use in the office. ACP can also supply a suitable drive.

Compatible

WE have a regular subscription to Electron User *but we no longer have an Electron, only BBC B with an Econet system.*

Could you tell me which games listings are fully compatible with the Electron and BBC Micro?

Fruit Worm from the January 1986 issue will not run, even after removing any obvious bugs. – **F. Scoote, Mayfield Middle School, Ryde.**

● Not all *Electron User* listings run on the BBC Micro. Basically the simpler the program the greater the chance of it working.

Fruit Worm is a complicated machine code program which isn't compatible with the BBC Micro.

However the author has converted it to run on it and *The Micro User* will be publishing it shortly.

Incompatible

I HAVE reached the tenth Dan in The Way Of The Exploding Fist by Melbourne House.

When I completed it the game just carried on at the same level which was a bit disappointing.

The way to beat the harder opponents is to jump over them and jump back quickly so that they have their backs to you.

Then you can kick or punch them. You must be careful though that you jump back quickly or you will be hit.

My high score on Fist is 71,900. I think it is the best game on the Electron but I can't get it to work on joystick.

I have a First Byte joystick interface. Can you help? – **Andrew Hagan, Hornchurch, Essex.**

● We've had a few letters saying that Exploding Fist doesn't work with joysticks plus First Byte interface. It sounds like the two aren't compatible.

Listings galore!

ONLY £3.75 each

Save yourself the chore of typing in listings by sending for our monthly tapes, packed with games, utilities, graphics and other programs from the pages of *Electron User*.

On the July 1986 tape:
ROYAL WEDDING Celebrate the royal event with our ingenious sliding block puzzle. **SNAPDRAGON** Two player version of the classic card game. **ATTRIBUTES** Colourful two player strategy game. **FORMATTER** Make your listings easier to read. **DISCS** Extended star commands. **EXTRA COMMANDS** A WHILE ... WEND command for your micro. **PLUS** Superb digitised picture of Andrew and Sarah.

On the June 1986 tape:
FISHING Enjoy a quite day by the river, and maybe catch your tea as well! **TACTICAL PURSUIT** A two player strategy game played with pawns on a chess board. **MINIBASE** Create an electronic telephone directory. **EXTRA COMMANDS** Add more commands to Basic. **SCREEN DUMP** Multi-tone screens dumps for Epson compatible printers.

On the May 1986 tape:
MISSILE JAMMER Defend the city of Pezina from a missile invasion. **VECTOR LETTERS** Use *LINE to create double height text. **DEGREES** Convert from Centigrade to Fahrenheit and vice-versa. **CROCODILE TEARS** Spell well or end up as a crocodile's dinner. **ZAP** Blast the marauding aliens. **EXTRA COMMANDS** Adding new keywords to Basic.

On the April 1986 tape:
INVASION FORCE Exciting zap 'em space game. **EASTER EGG HUNT** Seasonal game using compass points. **BACH TO BASICS** Music tutor. **NOTICE BOARD** Text scrolling utility. **SEARCH and RECOVER** Two routines from the disc article. **NOTEBOOK** Recursion backwards.

On the March 1986 tape:
GRAND PRIX Exciting race game. **DICE9** A clever test of strategy. **MARCHING ORDER** Counting and ordering numbers. **FIND AND REPLACE** Useful editing program. **SECTOR EDITOR** Excellent disc utility. **TIMEPIECE** Superb graphics demonstration. **OXO** Game of cunning. **TRICIRC** A circle of triangles.

On the February 1986 tape:
NECROMANCER Superb text adventure. **GREBIT** Arcade action. **FAST LOCKUP** Disc utility. **MACHINE CODE** How to write an arcade game. **TAPEDISC** More software transferring techniques. **SIDEWAYS RAM** Example program.

On the January 1986 tape:
FRUIT WORM An arcade classic. **HELICOPTER RESCUE** Pilot an air sea rescue helicopter. **MACHINE CODE** Detect collisions between sprites. **TAPEDISC** Transfer your software to disc. **MODE012** Multi-Mode screens.

On the December 1985 tape:
GET SET SANTA Christmas fun collecting presents. **MISSILE ATTACK** Save your cities! **PROGRAM PROBE** Using joysticks. **SPACE COUNT** Counting for youngsters. **CHRISTMAS CARD** Cards and carols for all. **DISC MENU** Disc Menu creator.

On the November 1985 tape:
KARATE WARRIOR Electrifying combat. **ULA** Mode 6 Mode 7! **PAINT ROLLER** Colourful arcade action. **DEFUSE** Beware the bombs. **SPRITE PRINT** Machine code graphics utility. **TRAIN** Far from stationery graphics.

On the October 1985 tape:
DUNGEON QUEST An amazing all action arcade adventure. **PILOT** Computer assisted learning language. **RAVING ROLLER** Arcade action in the garden. **TREE** Animated action. **KALEIDOSCOPE** Colourful graphics action.

On the September 1985 tape:
TEXNDAN 3D Wild West shootout. **PINTCURSOR** Machine code graphics. **SPRITE/ED** Sprite editor. **COMPOSE** Writing music simplified. **REVERSI** Cunning strategy game. **SIMPLEFILE** Save and read data. **BOUNCE BALL** Two player action. **ROTATE** Animation in a spin.

On the August 1985 tape:
DIGGA Exciting arcade action beneath the earth. **DODGE THE ASTEROIDS** Fun deep in space among the asteroids. **M/CODE GRAPHICS** Sliding pints of beer! ***FX** The OS explored. **MOVEIT** An intriguing sliding puzzle. **HEXGRAM** An educational game to increase your word power.

On the July 1985 tape:
MANIC MOLE Machine code action at its best. **HIGHER OR LOWER** Guess the card. **TIME BOMB** Carefully collect TNT. **M/CODE GRAPHICS** Two demonstrations. **FX1/2** The OS on call. **PIRATE MATHS** Sum fun. **NOTEBOOK** Password Generator.

On the June 1985 tape:
QUASIMODO Bellringing classic. **DISASSEMBLER** Machine code utility. **ACTIVITIES** Educational fun. **REFLECT** Aggressive aliens. **ENGINE** Animation. **DODGE** Race track action. **STRINGALONG** Scrolling fun. **CASTLE** Medieval graphics. **MATHS CURVE** Angles and art. **NOTEBOOK** Trees.

On the May 1985 tape:
SKRAMBLE! Compulsive arcade action. **SHEEPNIM** The logic game. **TEXTWRITER** Screen utility. **LIFE** A cultured classic. **CEDRIC** Educational fun. **THREE-D** Outstanding utility. **SPOKES** Fascinating graphics. **MOONORBIT** Heavenly displays. **BLAZON** Heraldic devices. **FLOWERS** A Basic bouquet. **NOTEBOOK** Annotated animation.

On the April 1985 tape:
SUPER ARCHER Target practice. **BINARY SEARCH** Search data efficiently. **JOYPLUS** Switched joystick routine. **ODD ONE OUT** Educational fun. **POLYGONS** 3D rotation. **MONEY CRAZY** Arcade action. **STARCHART** The night sky. **FORTUNE TELLER** Horoscope. **COLLISION DETECTION** Alien encounters. **HILO** Guessing game. **NOTEBOOK** Hello to assembler.

On the March 1985 tape:
MR. FREEZE Ice cube arcade action. **SCREENDUMP** Two procedures for printer dumps. **FILLER** The machine code fill routine. **FRED'S WORD GAME** Educational fun. **BIG LETTERS** Large text utility. **PERCY** Beat the burning fuse. **ANIMATION** Two example programs. **PIGS** Fying bacon. **NOTEBOOK** Display formatting.

On the February 1985 tape:
CRAAL The mystifying maze adventure. **BOUNCY** Addictively annoying action. **PAIRS** Can you remember the cards? **BASE** A Binary/hexadecimal conversion utility. **CATCHER** Collect the eggs before they break. **CLOCK** Time-keeping utility. **RACER** Grand Prix action. **NOTEBOOK** Graphics windows. **TRIG** All the right angles.

On the January 1985 tape:
SPACE BATTLE Destroy the deadly descending aliens! **NEW YEAR** A sound and graphics greeting. **ESCAPE FROM SCARGÖV** Minefield action. **PIE CHART** Statistics made simple. **CLAYPIGEON** An Electron birdshoot. **ORGAN** Music maestro please! **NOTEBOOK** An original program. **RANDOM NUMBERS** Or not so random! **SNAKES** Reptilean arcade action. **CHEESE RACE** Beat rival mice.

On the December 1984 tape:
CHRISTMAS BOX Align the presents logically. **SILLY SANTA** Sort out the muddle. **SNAP** Match the Xmas cards. **RECOVERY** The Bad Program message tamed. **CAROL** Interrupt driven music. **AUTOLOAT** A program that grows and grows. **NOTEBOOK** Simple string handling.

On the November 1984 tape:
STAR FIGHTER Anti-alien missions. **SCROLLER** Wrap around machine code. **URBAN SPRAWL** Environmental action game. **SPELL** Alphabetic education. **JUMPER** Level headed action. **CAESAR** Code breaking broken. **KEYBOARD** Typing game.

On the October 1984 tape:
BREAKFREE Classic arcade action. **ALPHASWAP** A logic game to strain your brain. **SOUND GENERATOR** Tame the Electron's sound channels. **MULTICHARACTER GENERATOR** Complex characters made simple. **RIGEL 5** Out of this world graphics. **MAYDAY** Help with your morse code. **NOTEBOOK** Palindromes and string handling.

On the September 1984 tape:
HAUNTED HOUSE Arcade action in the spirit world. **SPLASH** A logic game for non-swimmers. **SORT SHOWS** How sorting algorithms work. **SORT TIME** The time they take. **CLASSROOM INVADERS** Multicoloured characters go to school. **SAILOR** Nautical antics. **MATHS TEST** Try out your mental powers.

On the August 1984 tape:
SANDCASTLE The Electron seaside outing. **KNOCKOUT** Bouncing balls batter brick walls. **PARACHUTE** Keep the skydivers dry. **LETTERS** Large letters for your screen. **SUPER-SPELL** Test your spelling. **ON YOUR BIKE** Pedal power comes to your Electron. **SCROLLER** Sliced strings slide sideways.

On the July 1984 tape:
GOLF A day on the links with your Electron. **SOLITAIRE** The classic solo logic game. **TALL LETTERS** Large characters made simple. **BANK ACCOUNT** Keep track of your money. **CHARTIST** 3D graphs. **FORMULAE** Areas, volumes and angles.

On the June 1984 tape:
MONEY MAZE Avoid the ghosts to get the cash. **CODE BREAKER** A mastermind is needed to crack the code. **ALIEN** See little green men – the Electron way! **SETUP** Colour commands without tears. **CRYSTALS** Basic graphics. **LASER SHOOT OUT** An intergalactic shooting gallery. **SMILER** Have a nice day!

On the May 1984 tape:
RALLY DRIVER High speed car control. **SPACE PODS** More aliens to annihilate. **CODER** Secret messages made simple. **FRUIT MACHINE** Spin the reels to win. **CHASER** Avoid your opponent to survive. **TIC-TAC-TOE** Electron noughts and crosses. **ELECTRON DRAUGHTSMAN** Create and save Electron masterpieces.

On the April 1984 tape:
SPACEHIKE A hopping arcade classic. **FRIEZE** Electron wallpaper. **PELICAN** Cross roads safely. **CHESSTIMER** Clock your moves. **ASTEROID** Space is a minefield. **LIMERICK** Automatic rhymes. **ROMAN** Numbers in the ancient way. **BUNNYBLITZ** The Easter program. **DOGDUCK** The classic logic game.

On the March 1984 tape:
CHICKEN Test your nerve. **COFFEL** A tantalising word game. **PARKY'S PERIL** Parky's invisible maze. **REACTION TIMER** How fast are you ? **BRAINTEASER** A puzzling program. **COUNTER** Mental arithmetic. **PAPER, SCISSORS, STONE** Out-guess your Electron. **CHARACTER GENERATOR** Create shapes.

On the February 1984 tape:
NUMER BALANCE Mental arithmetic. **CALCULATOR** Make your Electron a calculator. **DOILIES** Patterns galore. **TOWERS OF HANOI** The age old puzzle. **LUNAR LANDER** Test your skill. **POSITRON INVADERS** The old arcade favourite.

On the Introductory tape:
ANAGRAM Sort out the jumbled letters. **DOODLE** Multicoloured graphics. **EUROMAP** Test your geography. **KALEIDOSCOPE** Electron graphics run riot. **CAPITALS** New upper case letters. **ROCKET, WHEEL, CANDLE** Three fireworks programs. **BOMBER** Drop the bombs before you crash. **DUCK** Simple animation. **METEORS** Collisions in space.

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Formatter

How to make long programs easier to read

By KEITH TRANGMAR

THIS is a machine code utility designed to make long listings of programs easier to read. When run it adds the new star command FORMAT to the operating system.

Long and complex lines where there are several statements separated by colons are often difficult to follow in a listing – especially on a screen in 40 column mode. So after entering:

*FORMAT

these multi-statement lines will be split up and listed with each of the statements on a separate line. When you've finished enter:

*FORMAT

again and formatting will be switched off. If you forget to switch it off before running a program you may find the program acting peculiarly as Formatter will format the text.

It works by intercepting the oswrch vector, since all text printed on the screen or printer passes through this.

Each character is checked to see if it is a colon and when one is found a carriage return, line feed and five spaces are printed before sending the colon.

The oscli vector is also intercepted by the routine. All star commands pass through this.

Any star command entered is checked to see if it is FORMAT. If it is it jumps to our routine, if not it jumps to the operating system as normal.

The Break vector is intercepted so that the routine will still function after Break or Control+Break.

Leave out lines 580, 590 and 600 until you have the program working correctly as these alter the vector.

```
  10 REM Listing Formatter
  20 REM By Keith Trangmar
  30 REM (c) Electron User
  40 FOR PASS=0TO2STEP2
  50 P%=&900
  60 command=&70
  70 wrchv=&72
  80 cliv=&74
  90 flag=&76
 100 colon=&77
 110 [OPT PASS
 120 \
 130 \ Change vectors to p
oint to user  routine
 140 .break
 150 BCS set_up:RTS
 160 .set_up
 170 CLI
 180 LDA#0:STA flag
 190 LDA &208:STA cliv
 200 LDA &209:STA cliv+1
 210 LDA &20E:STA wrchv
 220 LDA &20F:STA wrchv+1
 230 LDA#clint MOD256:STA
&208
 240 LDA#clint DIV256:STA
&209
 250 LDA#start MOD256:STA
&20E
 260 LDA#start DIV256:STA
&20F
 270 SEI
 280 RTS
 290 \
 300 \ Identify *FORMAT co
mmand
 310 .clint PHP:PHA:STX co
mmand:STY command+1:LDY#1
 320 .check_loop LDA (comm
and),Y:CMP format,Y:BNE not
_format:INY:CPY#6:BNE check
_loop
 330 \
 340 \ Print 'Ok.'
 350 LDA#79:JSR oswrch:LDA
#107:JSR oswrch:LDA#46:JSR
oswrch:JSR &FFE7
 360 INC colon:LDA command
:CLC:ADC#6:BCC skip2:INC co
mmand+1
 370 .skip2 TAX:LDY comman
d+1:PLA:PLP:RTS
 380 .not_format PLA:PLP:L
DX command:LDY command+1:JM
P (cliv)
 390 \
 400 \ Check for colon bei
ng printed
 410 .start CMP#58:BEQ che
ck:CMP#34:BNE oswrch:INC fl
ag
 420 .oswrch JMP(wrchv)
 430 .check LDA colon:AND#
1:BNE test
 440 .print_colon LDA#58:J
MP oswrch
 450 .test LDA flag:AND#1:
BNE print_colon
 460 \
 470 \ New line and tab
 480 JSR&FFE7:LDX#5:LDA#9:
.loop JSR oswrch:DEX:BNE lo
op
 490 JMP print_colon
 500 .format EQUS" FORMAT"
 510 ]:NEXT
 520 CALL set_up
 530 ?colon=0
 540 REM *THIS:BIT:IS:IN:S
PEECH:MARKS.*
 550 REM::BUT:THIS:BIT:IS:
NOT !:
 560 *KEY1 L.!N!M
 570 *FX138,0,129
 580 *FX247,76
 590 *FX248,0
 600 *FX249,9
 610 *FORMAT
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

Rick Hanson's back, as lively as ever

EXCITING news this month is that Robico has released Project Thesius, the follow up to Rick Hanson. It is subtitled Rick Hanson II and seems every bit as good as the last one.

Another new release is Gilsoft's Quill, which I hope to review next month. Shards also told me that it will have released a new game by the time you read this.

Called Operation Safras it will be presented in the same manner as Woodbury End and I look forward to seeing it.

I'm afraid I also have some bad news. I can no longer answer letters personally on problems in adventures.

My mailbag has been increasing steadily since I started this column and I now get over 100 letters a week, which leaves me little time to research and write the column.

I would ask those of you who are waiting for an answer to be patient while I clear the backlog.

Of course I still want you to write in with your problems and I will answer them through these pages.

I get great enjoyment from reading your opinions so please feel free to write in – if only for a chat.

I would like to point out though that about 90 per cent of the questions I am asked have already been answered in the column at some time, so it is always worth checking your back issues.

For anyone in desperate need of help I am starting a new section called the Lords of Adventure.

If you can help readers with any adventures let me know and I'll publish your name, address and the games you can help with. I'll make you one of my Lords of Adventure.

Citadel seems to be prompting a lot of mail and I am sure that anyone offering help would be much appreciated.

This month also sees the first Top Twenty. It has been compiled from all the marks sent to me over the last year.

Apart from the position that each game earned I have also given the average mark that each received. As you can see from the chart it has been very close.

Epic unsurprisingly won top spot and managed to get all of its range into the Top Ten. I wonder how they will fare against the new competition from Robico in the coming year?

Melbourne House has also done well in getting its three games into the Top Ten.

Woodbury End is a recent release from Shards and has done superbly to get into the charts in so short a time.

Keep your marks coming in for the next Top Ten.

Ian Ruthven who has sent in tips for Twin Kingdom Valley which I will be revealing in the future has also asked for help with Citadel. Any Lords or Ladies of Adventure care to oblige?

Guy Richardson asked for Merlin's help but didn't specify what with. What do you want help with Guy? Unfortunately my magic powers don't stretch to mind reading.

Neil Sedgwick came up with two worthwhile suggestions for software houses. Firstly, enclose a second cassette with the adventure to be used as a save-game tape.

This would avoid the need to search through various cassettes for the right tape – especially useful if you haven't played the game for a while.

Secondly, why not have a compilation tape of adventures? Quite often when compilation tapes are released there are a couple of games and one adventure so why not have all adventures?

I agree with both of these suggestions Neil – software houses please note.

Richard Jay is compiling a database of adventure clues and asks me to print his name and address so that readers can send him maps and solutions for it.

You can write to him at 102 Highcliffe Road, Wickford, Essex, SS11 8JX.

I'm not quite sure how you stand with copyright laws if you market this Richard, but I would think it only fair to give copies of your database to any reader who writes in.

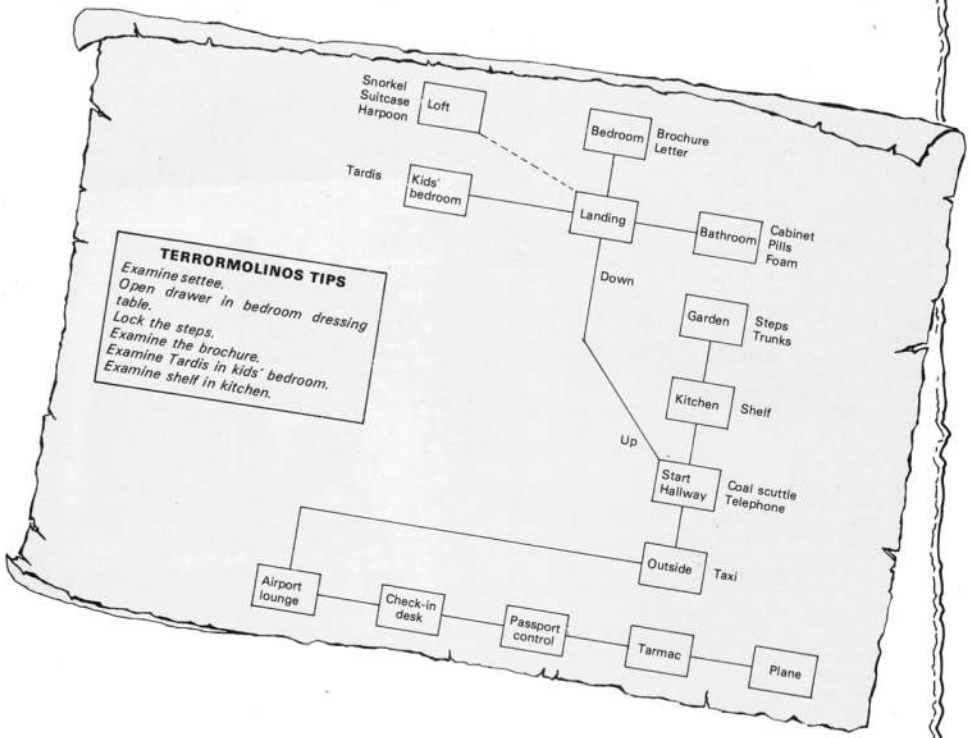
W.E. Trevelyan asked if I would indicate the age level that a program is aimed at when I review it.

He goes on to suggest that Adventureland is aimed at players up to the age of 12, the Epic games at astute 14 to 15 year olds and Hampstead at the 18+ age range.

Frankly I don't think you can categorise adventures this way. Adventureland, the first

Adventures Top 20

1	*Wheel of Fortune*	Epic	91
2	*Castle Frankenstein*	Epic	86
3	*Classic Adventure*	Melbourne House	84
4	*Kingdom of Klein*	Epic	83
	Countdown to Doom	Acornsoft	
6	*Hampstead*	Melbourne House	82
	Terrormolinos	Melbourne House	
8	*Woodbury End*	Shards	81
9	*Twin Kingdom Valley*	Bug-Byte	80
10	*Quest for Holy Grail*	Epic	79
	Eye of Zoltan	Softek	
12	*Spiderman*	Adventure Int.	78
13	*Sphinx Adventure*	Acornsoft	77
14	*Greedy Dwarf*	Dorling Kindersley	76
	Strange Odessy	Adventure Int.	
	Staff of Law	Potter	
17	*Pirate Adventure*	Adventure Int.	75
18	*Adventureland*	Adventure Int.	74
	Five Stones of Anadon	Softek	
20	*Galadriel in Distress*	Potter	73
	Incredible Hulk	Adventure Int.	



TERRORMOLINOS TIPS

Examine settee.
Open drawer in bedroom dressing table.
Lock the steps.
Examine the brochure.
Examine Tardis in kids' bedroom.
Examine shelf in kitchen.

home computer adventure, first saw light of day on a TRS-80.

In those days a 12-year-old would be unlikely to have access to the computer, let alone the game itself.

I respect all my reader's opinions, but in this case I would like to point out that I have received letters from people aged between 5 and 75 about the games you mention.

I feel that the only way to categorise an adventure is by how difficult it is compared to its cost. Even then it is only one opinion and will obviously differ from person to person.

Incidentally my "inexplicably cool opinion" about Hampstead was due to it relying too heavily on humour for atmosphere, and since the humour didn't appeal to me I didn't feel there was any atmosphere.

I appreciate that it is a complex adventure and its popularity in the Top Twenty proves that most readers like it, but I didn't. Terrormolinos on the other hand appeals immensely to me.

Merlin

Contact Corner

If you want an adventure pen-pal why not write to one of the readers mentioned here.

Anyone who wants their name included should write in, making sure that their name and address is legible.

○ Jason Harken, 156 Black-a-tree Road, Nuneaton, Warks. CV10 8AG.
○ Mike Lacey, 397 Baker Street, Alvaston, Derby DE2 8SJ.
○ Alan Jones, 5 Hayes Close, Newtown, Bristol BS2 0AG.

Hall of Fame

Woodbury End
Les Shipton

The Help clues continued –

● Office hours suffice. Get the keys from the Mayor's office between the hours of 8 and 5.
● Open Sesake. Go into the records office and start reading the report.
● Pick a so near give cheer. Examine the print for the combination to the shed. Don't take the print with you though.
● Digital do-it-all. Getting the cube from the shed.
● Well can you handle that. Turn the well handle and look.

Wheel of Fortune
Craig Romans

You will now be underground so use the lamp, but since you are in real time be careful not to waste it.

Collect as much treasure as you can, but make sure you work your way south and go into the fly's cave and back out into the spider's cave – don't waste time though.

Now get the wheel and go back to the fly's cave for the penny. Decide for yourself what you want to leave underground, but make sure you keep the basket.

Go to the steps and up to the trapdoor. Unbolt it and go up into the building.

Now go to the machine and insert the penny. Go back to the building and leave all your treasure except the music box. Now spin the wheel.

Spiderman 2
Robert Henderson

Go to floor 1 and give the calcium to the lizard. Go into the hall and shoot a web at the bio gem. You can now take it.

Go to the sandman's room, then up on to the celing and

→

From Page 57

LOOK CRIB. Get the formula then look again and get the gem.

Drop the formula, GO FLOOR and leave the room. Go to floor 2 then outside until you are floating.

FEEL NORTH, get the gem, go south and FEEL SOUTH and get the other gem. Then JUMP UP, take the mesh and enter the fan.

Keep shooting web at it until its speed falls to 50 RPM. Now shoot a web at the button and CRAWL FAN. Keep going down until you see Dr. Octopus.

Gisburne's Castle
Paul James

Use the oil on the rusty door to free it, then open it with the key. Use the potion to reduce your size. The spade is used in the dungeons to get to the cellar, and the cannon ball and gunpowder are used to load the cannon. If you have found the cannon you have also found Gisburne. Finally use the flint to fire the cannon and kill him.

The Count
A.J. Haynes

Day 1. Get up and wait for the bell to ring. Go to the front door and take the postcard.

Now go to the kitchen and lower the dumb waiter when you have entered it. GO ROOM, take the clip from the postcard and pick the lock.

Keep the clip but store all the other objects in the room with the century worth of dust. Lock the door and go to bed and sleep.

Revenge of Zor
H.J. Bastien

Search for the courtyard for a rope and frisk the guard for a whistle. Throw and pull the rope to free the grating.

Throw the rope again and climb it. Now blow the whistle in the forest to get a fly swatter and push the altar and read the book. The book gives the ingredients to use in the mixing bowl. Kill the flies with the swatter, then drop them to make the frog appear. Finally throw the net to catch the frog and bat.

Feedback

Dave Frankham has sent in a map and solution to **Gisbourne's Castle.** If anyone wants a copy please send an sae.

Incidentally, Dave, I'd recommend either the Epic or Robico range for your next adventure.

J. Foggitt offers help on Nicholas Latham's problem with **Bored of the Rings.**

After leaving the downs go along the East/West road until you are next to the mountain.

There is an exit North here which leads to the mountain where you'll find a bag of pepper.

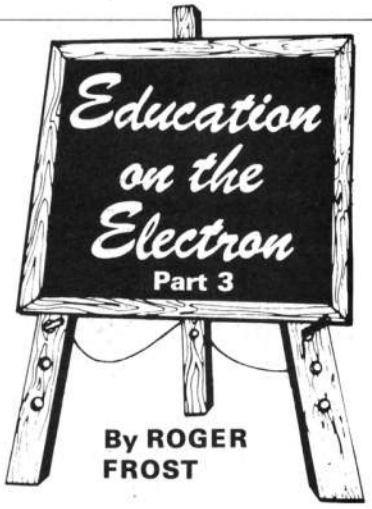
Go to the Morona gate, collecting your friends from Riverdull along the way, and then drop the bag. One of your friends will sneeze and provide a means of getting through the gate.

W.E. Trevelyan reveals that Lou Carey is wrong to say that in **Galadriel in Distress** both the bottle and the goblet contain poison.

It is in either one or the other depending on a ransom spin of a coin. The Loremaster will tell you which is safe and which is not.

M. Alexander has sent in a solution to **Sphinx Adventure.** An sae please if you want me to send you a copy.

Little 'uns learning to play, and playing to learn



MANY parents have bought an Electron for children with some hope that it might help in their education. For teenagers this could mean buying an exam revision package, but for youngsters aged less than 11 the computer may seem a white elephant.

Its main use appears to be for shooting aliens or outwitting gorillas, and most people do not think of such arcade games as educational.

The aim of this article is to help parents and children get a bit more education from the Electron, while still keeping that vital element of fun.

Let's start with the very young – the under-fives or non-readers. There are quite a number of programs aimed at this age range which can help to teach a range of skills.

These may involve colour matching or recognising similar shapes. Children may be required to compare the attributes or features of pictures, or organise a sequence of events.

This may not sound like traditional learning, but for a child to be a successful scholar he or she must develop good visual discrimination and be able to plan a course of action.

In fact the skills of visual discrimination, matching and sequencing are vital for any child who is learning to read.

Programs for pre-readers can often be found in magazines. The Simon game, for instance, encourages memory and sequencing.

Pelmanism is a memory game, and on the computer it stimulates cooperation with other people rather than competition.

Examples of these types of programs can be found in the Fun School series *(Page 51)*.

Mirrorsoft produces excellent software for youngsters. The funny and stimulating Mr Men programs are highly recommended.

Arcade games have value too. One like Acornsoft's Snapper is fairly easy to play and encourages good hand and eye coordination and a bit of forward planning.

However don't expect under-fives to sit at the computer on their own. Contact with a sympathetic adult is essential.

A grown up can ensure that the computer is used sensibly. There seems little point, for instance, in getting children to count balloons on a screen when real objects can be handled.

Mathematics, though, is a symbolic representation of reality. The Electron can be a real help with learning the value of a number and the symbol used for it.

Choose one which gives a good graphic and sound reward for success. However make sure that the failure routine is not so interesting that kids will be encouraged to get things wrong.

There are a number of programs for children who have acquired the rudiments of reading. A favourite of many five and six year olds is Podd published by ASK.

Podd is a large figure who can do 120 things. All youngsters have to do is type in a "do" word. If Podd can do it he graphically does it. If he can't he says he's sorry.

ASK has deliberately not supplied a list of the things that Podd can do, so children and the adults who help them must use their own ideas.

It's a very simple program that encourages little ones to think, spell accurately and use their imagination.

For early readers there are various levels of Read Right Away from Highlight Software. These provide practice at matching beginnings and endings of words and help children to learn about the sounds groups of letters make.

Like the Mirrorsoft Mr Men programs, they will cater not only for new readers, but for competent ones too.

When selecting software to assist with reading make sure it is suited to your child's ability. If the program is too difficult for a child boredom will quickly set in.

Another point to bear in mind is that many different reading schemes are used in schools. The wrong software could confuse a new reader.

Try to find out which system your child uses and if a particular program is suited.

For children who can read

Arcade games have value too . . . Acornsoft's Snapper is fairly easy to play and encourages good hand and eye coordination

From Page 59

reasonably well text adventure games stand head and shoulders above all others as far as educational value is concerned.

A good adventure like a good book will encourage children to read, but as an extra, responses are required which need to be well thought out and correctly spelt.

While playing adventures a child is having to solve problems and if the program is well written the problems should be logical.

Adventures are usually so big that a child, or an adult, can't remember everything. This leads youngsters into realising that they will have to keep a record of where they have been and what they have found.

So adventures, which are usually thought of as games, will get youngsters reading, writing, recording in map or table form, problem solving and thinking logically.

If you can get more than one child to work on an adventure you get the added benefits of verbal reasoning and discussion.

That's not a bad cross section of the activities that go on in a primary school.

> *"Children aged eight and upwards may cope with adult adventures"*

Children aged from about five will be able to cope with the more simple adventures, but a friendly adult will probably need to be at hand to encourage them.

One of the best starter adventures is The Magic Sword, from Database Publications. This package starts with a picture story book which sets the scene.

The program, which extends the story, makes use of simple graphics and sound.

The text is straightforward and well thought out, and the responses required by players are kept to a minimum to avoid frustration.

A compass is permanently displayed and a game can be saved to cassette for completion later. If you've got children under nine and want to get just one good program this is the one I would recommend.

There are, of course, other good adventures written with children in mind. Comsoft produces the excellent Serpents Lair and Tynesoft has released Super Gran for the Electron.

Children aged eight and upwards may cope with adult adventures, and graphic adventures such as Repton and Citadel will provide many of the same skills as text versions.

A quick look at Merlin's Cave will give you lots of other titles to choose from.

If you don't like the fantasy nature of adventures then you could follow the lead of many schools by using simulation programs.

In these children take on the role of a different person and have to cope with the problems of a totally different lifestyle.

Among the best of these is Osprey, from Bourne Educational Software where you take the part of a warden protecting a site containing osprey nests.

You have to decide how to allocate resources to ensure success for the ospreys, but also enjoyment for tourists in the area.

A program like this has many of the same educational points as an adventure, but will also induce children to consider the consequences of their decisions.

Once again, simulations are ideal for a team effort, so that ideas can be pooled and decisions thrashed out.

Many other simulations are used in schools. They may have a historical or geographical flavour. They can have a sporting basis, such as Football Manager, or they can even use foreign language skills.

The content of such programs may be important, but it is secondary to the skills gained by children.

The computer allows a child to think of a possible course of action and then test it. That's something that often can't be done in reality because of cost and danger.

For instance in Francis Drake by LCL the problems of being a Tudor mariner can be explored.

As well as programs that might help the general education of your children there is plenty of subject-specific software.

There must be enough number programs to keep a budding Einstein busy just counting them. Most involve addition, subtraction, multiplication and division.

Another frequently covered subject is telling the time. Here Alligata's Primary Time is worth looking at.

Kosmos produces a neat Geography program and Chalksoft's Note Invaders will help with musical notation.

Make sure any program you buy has a fun element to it. If the program is dull it won't be willingly used.

That's just about it for educating under elevens on the Electron. Don't forget the word processors and databases, and remember that computers are just as much for girls as for boys.

● *Next time we'll consider the pros and cons of youngsters learning to write simple programs.*

'There must be enough number programs to keep a budding Einstein busy just counting them'.

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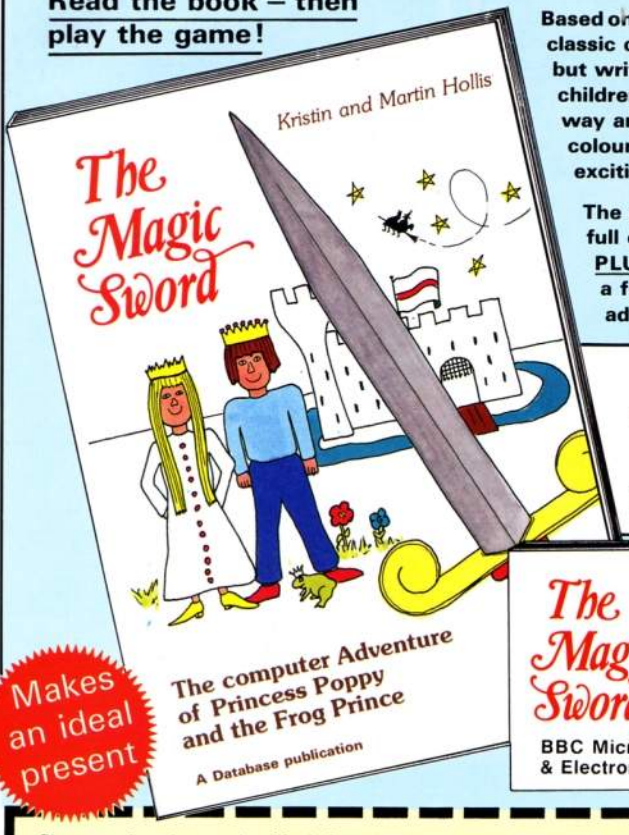

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ELECTRON

WORD PROCESSOR

This is the one designed for the two finger typist and has received rave notices over the past two years. It allows continuous typing, with no need to look at the screen, with line ends, margins and everything else automatically sorted out at the printing stage by the Embedded Control Characters —as used by professional word processors.

You can automatically move left margin, decrease characters per line, centre text, right justify, new line, new paragraphs, new page, underline, and enlarged, emphasised and condensed characters.

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The new Arcade from Kansas—a four in one game with four entirely different and active, colourful screens. Drive the Loco, switching lines, firing harpoons and smoke to evade the rockets and planes. Then get to the buffet car by jumping the gaps and avoiding the cannon balls and arrows. If you make it, then it will be all out catching the spinning cups from the three tables. Then as you come to a standstill, in the last screen you have to find out how to release the brakes.

MOON BUGGY

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An ultra active arcade game which outsold everything when on display at the last Micro User exhibition. Needs no small amount of skill to get past the first level and there are seven of them! Manipulate the Buggy three different ways as the ground speeds by and at the same time use the different firing directions to splat or jump the many obstacles. There are craters, boulders, debris, mines, tanks and bridge traps. Spacecraft and rockets all add to the excitement. This is a very challenging one, with single hazards, multiple hazards and even combination hazards. Multiple scenes with fast fluid action.

PINBALL ARCADE

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The only game ever to achieve FIVE five star reviews in the Press! Now faithfully converted to the Electron, with all the original BBC features, and running at the correct speed. Build your own pinball tables from the many bumbers, targets, slings, etc., from the six pages of colourful shapes, moving or re-moving anywhere on the board. Adjust tilt, bounce and even alter the scores. A most realistic spring action and even the strength of the flippers are adjustable. After a board as been created, it can be saved to tape, played and even altered again.

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There's never been anything like it before! An entirely new computer language—TOC—has resulted in cramming a virtual 60K Adventure into the normal Electron! Devised by the programmer, this has resulted in the most involved and devious Adventure ever to appear on the Electron, with literally around half a screen of text depicting each location and objects. Hundreds of real locations and countless objects and things take the adventurer onto a totally different plane.

It is the only Adventure to accept more than a two word command. Such as TAKE SKULL FROM SHELF OPEN DOOR is quite acceptable! It will even accept multiple commands. Set in the future, it is a magical quest in a wasteland populated only by fanactical devil worshippers and savage pirate hords, to which you are sold as a sacrifice. Do not expect to complete this Adventure in a few evenings, it will take a long, long time. And you will need our Help! service...

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Take the barrow down the lift into the many galleries of the mine, first to dig for diamonds and then for gold. Astute use of the lift and ladders and you might escape the monsters—or lead them to their destruction. Then go down for coal to re-fuel the furnace, which depletes as you use energy for the lift.

MANIAC MOWER

Catalogue price £8.50

Try to mow the grass in the park whilst avoiding the maniac mower, whose only aim is to cut you up! To make it harder there are lots of nasties lurking in the grass —all out to get you. To make it harder still there is a karate expert training in the park, who is very unfriendly indeed!

HARLEQUIN

Catalogue price £9.95

Played by one, two or four players. Harlequin is a very different sort of game—treasure hunting on the computer! Try to find which of the 14 treasure places the treasure is hidden, using the given clues. In addition to the information, there are lots of different tunes, very well done, with plenty of colour.

MUNCHMAN

Catalogue price £8.50

This is the one that started it all—a real live 'Packman' for the Electron. It is just like the original Arcade game with ghosties chasing you around as you devour, with all the facilities of the energisers which give limited time to zap the ghosties.

SNAKE

Catalogue price £7.50

Seven hectic levels with split screen and even double split screen make this very active indeed. The snake gets longer as the mushrooms are devoured, but avoid the toadstools at all costs. Ideal for young children, whilst by increasing the speed, active for adults and experts too.

REVERSI

Catalogue price £7.50

The Electron as your partner at Reversi—also known as Othello. Plays to all the rules with accepted black and white counters on a green board. Moves easily entered with very quick responses. All information and scores on the screen.

DRACULA ISLAND

Catalogue price £9.50

This Adventure has started countless people on adventures and provided a great deal of pleasure. The aim is to find and kill Count Dracula before he gets you. It is an ideal starter, needing plenty of effort to solve but not being too difficult to finish. Like all Kansas adventures, it is totally logical, which means things are always in the same place or where you leave them. Also like every Kansas adventure it has a game saving facility. And if you really get stuck, don't throw it away in disgust—give us a ring, for we operate a telephone Help? service!

RING OF TIME

Catalogue price £9.50

The sequel to Dracula, this is a little harder to solve, though still retaining all the features, including the split screen, which means the important information remains on the screen all the time. The object is to retrieve the elusive Ring of Time, going through many trials and tribulations.

REVENGE OF ZOR

Catalogue price £9.50

The long awaited sequel to Dracula and Ring of Time. Somewhat more difficult in this Adventure you have to escape the vortex and the revenge of the evil Zor. This is a natural progression, and the adventurer will find the programmer has become much more devious, thus requiring greater effort to solve.

Kansas

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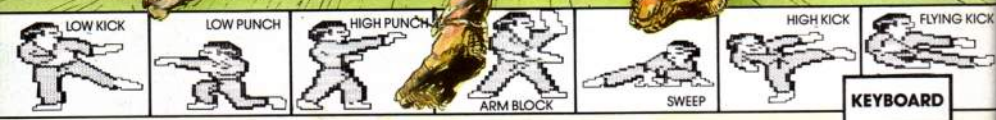

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